the OIL AND GAS JOURNAL

THE PLUS YOU GET IN HUGHES "FLASH-WELD"

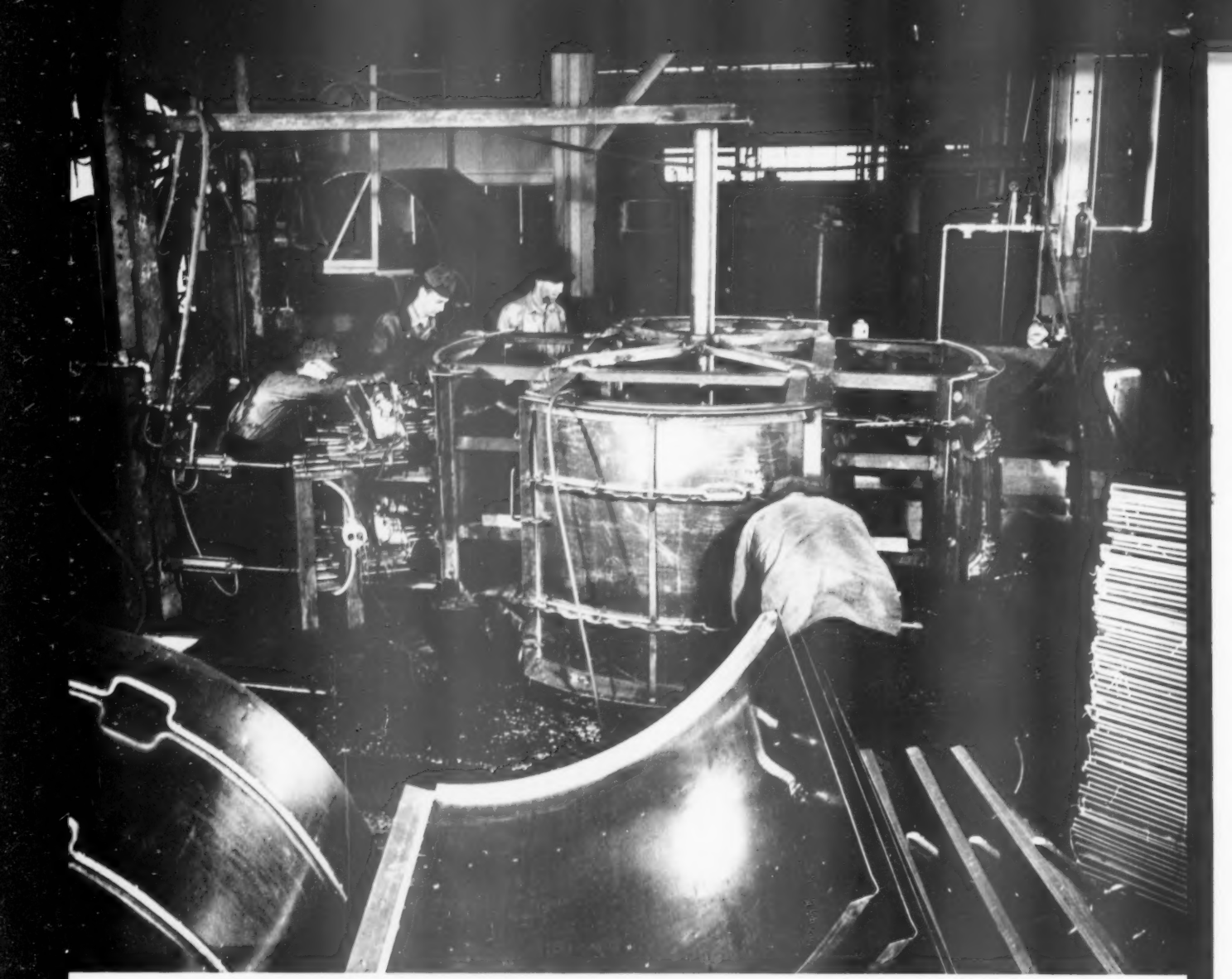
EXPERIENCE... years ahead of the field, Hughes Tool Company developed and perfected the Flash-Weld process for unitizing drill stems. In 1938, Hughes made the first Flash-Weld string.

In the past fifteen years approximately one million Hughes Flash-Weld Tool Joints have been used in unitizing 30 million feet of drill pipe. This is more than enough to equip every rotary rig in the world with a complete drill string.

When you specify HUGHES Flash-Weld Tool Joints you get the industry's greatest Flash-Welding experience.

FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 NOVEMBER 2, 1953



Uniformity and Interchangeability . . .

● It was a MUST that Uniformity and Interchangeability be maintained in fabricating the covers for the electrolytic reduction cells in the Rockdale Works of the Aluminum Company of America, a requirement which Wyatt's accomplished while delivering this 70,000 pounds of finished aluminum parts without a rejection .

Wyatt's

HOUSTON-DALLAS-NEW YORK-TULSA

MANUFACTURERS AND ERECTORS SINCE 1913

OIL AND GAS JOURNAL

NOVEMBER 2, 1953 VOL. 52 NO. 26

OIL IN THE NEWS . . .

$76,000,000 Gas-Line Expansion Program Nearing End	58
Third Annual Gulf Coast Geological Meeting Held	60
Buckeye Formally Opens 368-Mile Products System	61
Latin American Investments of U. S. Oil Firms Soaring	62
Interior Refuses to Permit Santa Ynez Watershed Leasing	62
Military Purchasing Agency Expanded to Increase Effectiveness	62
Independents Offer Wide Variety of Solutions to Import Problem	64
Gasoline Octane Rating of 99.7 Predicted by 1961	66
Survey Shows Average Octane Rating Up From Previous Quarter	68
New Gas-Measurement Device Needed, A.G.A. Told	69
Otto D. Donnell to Receive A.P.I. Gold Medal	70
New Greases Usable in Wide Temperature Ranges Described	70
August Imports 52,000 Bbl. Daily Higher Than Last Year	71
Spray Loading of L.P.G. in Tank Cars Cuts Evaporation Loss	72
Lower Tanker Rates Make Trans Mountain Crude Less Attractive	74
Free World Production Shows Decline During August	76
Rigs Operating in Venezuela Totaled 110 in September, Study Shows	77

NEWS FEATURES . . .

They Say	48
Calendar of Events	50
Journally Speaking	53
Editorial	55
This Week	57
Watching Washington	63
International News	76
Personals	78
Deaths in the Industry	81
Pipe-Line News	161
Refining News	164
Petrochemical News	165
Natural-Gasoline News	169
Exploration Statistics	213
Production Statistics	214
Refining Statistics	215
Market Statistics	216

TECHNOLOGY AND OPERATION . . .

[1]SYMPOSIUM . . . Use of Wire-Mesh Sections in Asphalt Entrainment Control in Vacuum Pipe Stills	82-87
Wire-Mesh Case History, Sinclair, Wyoming	82
Wire-Mesh Case History, Cosden Petroleum Corp.	84
Wire-Mesh Case History, Sinclair, Marcus Hook	86
Wire-Mesh Case History, General Petroleum Corp.	87
Oil Prospects in Southeastern Turkey	88
[2]What's Been Happening in Catalytic Cracking? *By J. W. Moorman*	92
Pressure-Maintenance Operations in Texas	105
Problems in Hydrocarbon Extraction—2	108
[3]Compounding of Pumps for Jet-Bit Drilling *By R. J. Meers*	114
Systemic Approach to Corrosion Mitigation	116
Sizing Tank-Farm and Delivery Lines—Errata	121

DEPARTMENTS . . .

Books	107-111
On the Job, in the Plants	119
Engineering Reference	125
Modern Drilling	127
Engineering Fundamentals	129
Questions on Technology	130
Refiner's Notebook	133
Heat Transfer	135
Equipment Men in News	137-202
Pipe-Line Construction	146
Equipment Digest	155
Refinery Construction Index	164

EXPLORATION . . .

Williston Interest Is Here to Stay	171
Highlights of Week's Developments	171
What's Down There?	172

FIELDS . . .

Drilling Contractors	167
Active Rotary Rigs	168
Area Field Reports	177

In Brief . . .

1. NEW DISTILLATION TOOL . . . Wire-mesh sections may be used to sharply reduce asphalt entrainment in vacuum pipe stills. These sections consist of layers of fine knitted wire of a metal alloy suitable to stand up under the operating conditions imposed. When vapors containing finely divided liquid mist are passed through these mesh sections, over 99 per cent of the entrained liquid droplets impinge on the wire, coalesce into large drops, and drain free from the mesh section.

This symposium concerns an important use of these sections in preventing the entrainment of heavy asphalt with vacuum vapors, and the resultant contamination of vacuum distillate streams. The result: cleaner cat feed stocks, lube stocks, and other product streams. The substantial lowering of carbon residue and metal contamination can result in marked improvement in catalytic cracking capacity and catalyst activity.

The mesh sections must be supported on knife-edged members. Simply laying the mesh blanket on a perforated tray, or a substructure of bars or beams will result in rapid clogging. A straight-line upward flow of vapor through the mesh is desirable, and proper spacing in the tower is important. Certain precautions must be observed in bringing the unit down.

2. WHERE ARE WE IN CAT CRACKING? . . . (1) Catalytic cracking capacity in the United States now approaches 3,000,000 bbl. per day, or approximately one-third of the crude run. (2) Latest Journal refinery survey shows that some 130 refineries out of a total of 323 have cat cracking facilities. (3) The purely mechanical difficulties which hampered early cat cracking operations have not largely been overcome, and emphasis has shifted toward obtaining optimum performance. A better understanding of how the cat cracker functions is therefore in order. This is the first of a series of articles on this subject. Other articles will be devoted to the major factors involved in fluidized and moving-bed operations, with particular emphasis on operating variables.

3. MORE DRILLING POWER . . . Compounding of power pumps in jet-bit drilling operations makes available higher hydraulic horsepower at the bit. At the same time flexibility in the pumping system is maintained. Minimum equipment necessary to compound power pumps are pulsation dampeners, vibrator hoses, and suction-line valves or line blinds designed to meet the higher pressure.

choose it on these charts...

RATED HP. CURVES FOR CONTINUOUS HEAVY DUTY SERVICE

(Gas or Gasoline)

Recommended continuous hp. for each size engine is shown by the combined dotted and solid graph line which represents the governed engine speed range for continuous service.

Hp. ratings are for heavy-duty continuous service. Maximum hp. ratings are not shown. Highest speed shown for each size is for heavy-duty pumping service, and in every instance is less than 900 f.p.m. piston speed.

To realize the full advantages of ample flywheel effect, it is best to select the engine to operate at the higher speeds indicated by the solid graph line.

Engine should not operate at speeds less than 225 r.p.m., as limited by magneto impulse coupling.

...and be right!

When you choose a Fairbanks-Morse "ZC" Engine for your pumpers, you're not guessing about horsepower ratings. For "ZC" engines are *not* rated by maximum horsepower . . . they *are* rated by horsepower for *continuous heavy-duty service.*

Fairbanks-Morse conservative ratings give you the data from which you can select with safety, knowing that there is an ample reserve to meet the momentary peak loadings you will encounter.

For the complete story on the "ZC" . . . the engine with the *big double wheels* . . . see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

1. **Low initial cost**—A substantial saving in basic sweetening equipment is possible if you are starting from scratch to use Du Pont Antioxidant No. 22. However, if existing equipment is to be employed you will benefit by—
2. **Low revamping cost**—Because antioxidant sweetening is a simple procedure, the cost of revamping existing equipment is considerably cheaper than when treating agents, other than Antioxidant No. 22, are used.
3. **Lower operating costs**—While operating costs vary with treating methods the use of Antioxidant No. 22 reduces the need for additional chemicals and reduces regeneration expenses.
4. **No undesirable chemicals**—Since Antioxidant No. 22 sweetening does not require the use of sulfur or copper, the chances of reduced efficiency of additives resulting from these elements in the gasoline is eliminated unless they originate from some other source.
5. **Antioxidant and sweetening agent combined**—These two qualities are available in the single, inexpensive operation of adding Du Pont Antioxidant No. 22 to your stocks.
6. **No gasoline loss—no octane loss**—With some sweetening methods there is a definite gasoline loss during processing; in other cases there is a loss in octane number. There is no loss of gasoline or octane number with Du Pont Antioxidant No. 22.

DU PONT ANTIOXIDANT No. 22

Du Pont Antioxidant No. 22 is N:N'-di-secondary butyl-para-phenylenediamine. Since different gasoline stocks vary widely in their response to antioxidant sweetening, additional information on the advantages and application of this process to your stocks is available through any Du Pont Petroleum Chemicals Division representative.

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

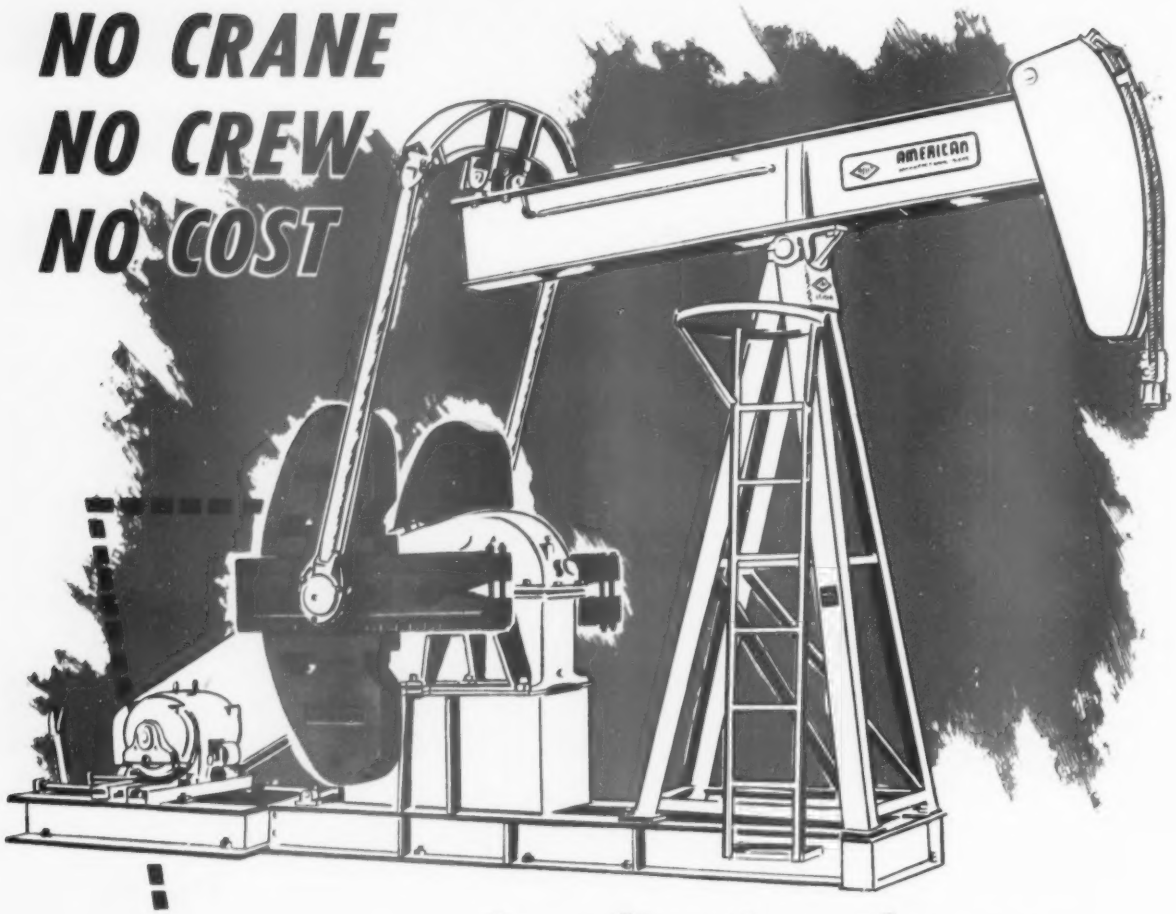
E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices:

NEW YORK, N. Y.—1270 Ave. of the Americas	Phone COlumbus 5-3620
CHICAGO, ILL.—8 So. Michigan Blvd.	Phone RAndolph 6-8630
TULSA, OKLA.—1811 So. Baltimore Avenue	Phone Tulsa 5-5578
HOUSTON, TEXAS—705 Bank of Commerce Bldg.	Phone PReston 2857
LOS ANGELES, CALIF.—612 So. Flower St.	Phone MAdison 1691

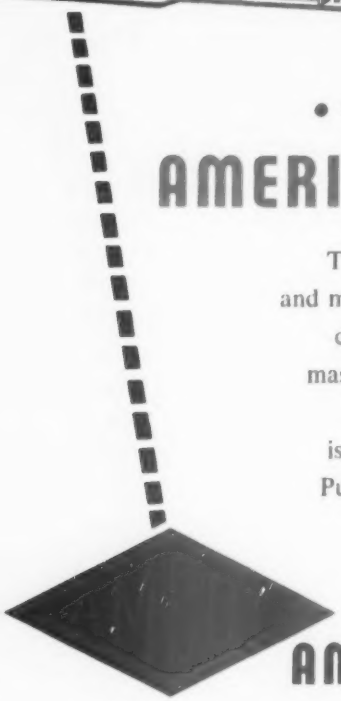
IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.—Calgary, Alta.
OTHER COUNTRIES: Petroleum Chemicals Export—Nemours Bldg., 6539—Wilmington 98, Del.

NO CRANE
NO CREW
NO COST



...in adjusting the new AMERICAN *Counterbalance Crank*

This new American Pumping Unit saves you operating time and money because it is a fast, easy one man job to adjust the unit counterbalance. Simply loosen two bolts that hold each master weight in position and turn the acme screw that moves the weight to the desired position. Yes, that's all there is to adjusting the unit counterbalance on the new American Pumping Units. Specify American and cut *Your* operating cost. Send today for free catalog or contact your nearest supply store or American Office.

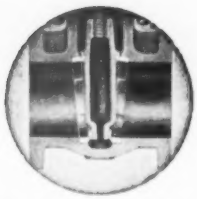


AMERICAN MFG. CO. OF TEXAS

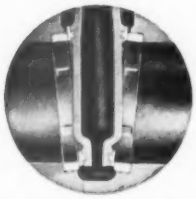
FORT WORTH 11, TEXAS

Houston • Kilgore • Odessa • Tulsa

Calgary, Alberta, Canada

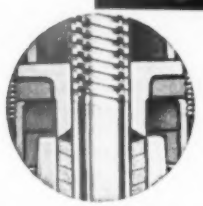


Straight-Flow Port Design reduces fluid turbulence to a practical minimum.



Seat Rings of end-seated type are screwed into the body.

Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.



Brass Liner on Glands assures greater resistance to corrosion and scoring.

WALWORTH

iron body gate valves

with screwed or flanged ends

... 8 Outstanding Features

For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.

WALWORTH

valves and fittings

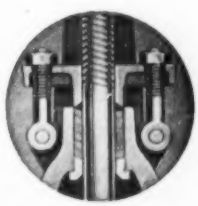
60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.

Bronze Back-Seat Bushings in bonnets of OS&Y valves.

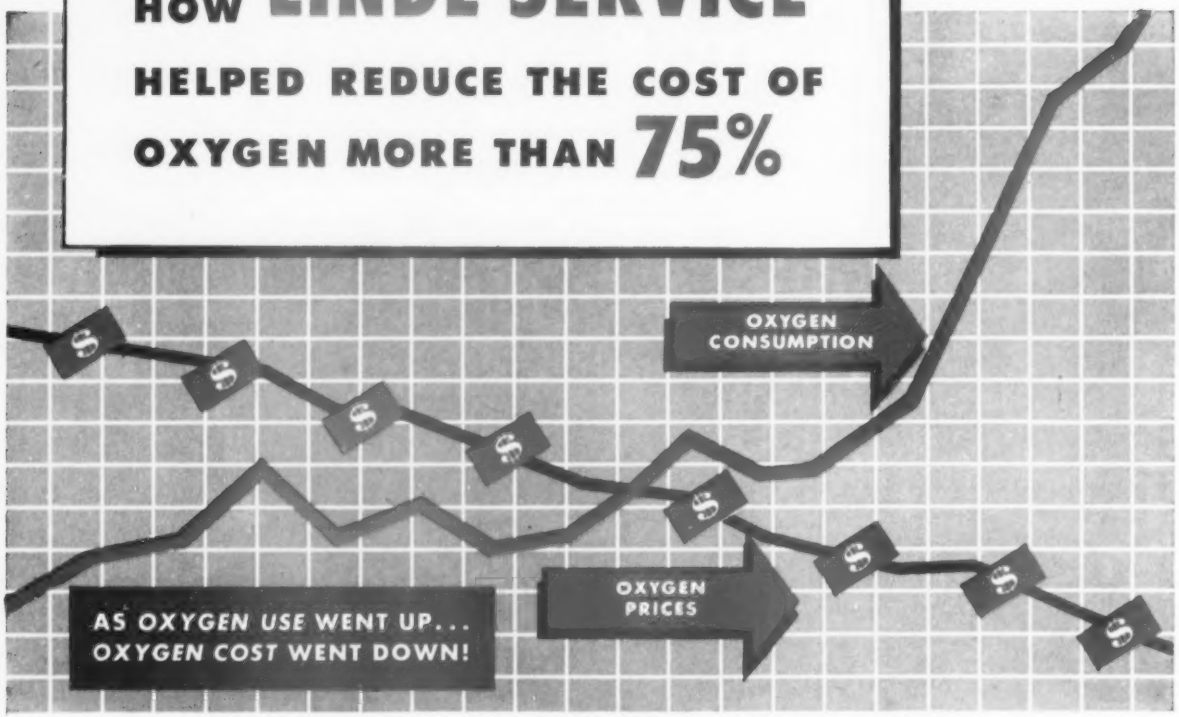
Solid Web Type Disc in OS&Y valves for greater strength and longer service.



Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

The Oil and Gas Journal, published Mondays, copyright 1953, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

HOW LINDE SERVICE* HELPED REDUCE THE COST OF OXYGEN MORE THAN 75%



LINDE SERVICE has brought about important improvements in oxygen production, distribution, and methods of use. In profiting by these improvements, LINDE customers have increased their use of oxygen per ingot-ton of steel produced more than 12 times in 25 years. This increased volume of usage in turn enabled LINDE to reduce the cost of oxygen more than 75% in that time.

With LINDE Oxygen you get *all* these important advantages—

- **DEPENDABILITY OF SUPPLY** —— No oxygen shortage due to failure of a single plant. Many strategically located plants to meet every demand.
- **FLEXIBILITY OF SUPPLY** —— No fixed capacities. You get what you need when you need it . . . and pay only for what you use.
- **LOW UTILIZATION COST** —— No capital investment . . . no costly maintenance.

PLUS . . . LINDE SERVICE—

The unique combination of research, engineering, and over 40 years of accumulated know-how that is helping LINDE customers save money and improve production in their uses of oxygen and oxy-acetylene processes.

If your company uses oxygen, LINDE SERVICE *can mean dollar savings to you. Let us tell you more about it.*

LINDE AIR PRODUCTS COMPANY

A Division of UNION CARBIDE AND CARBON CORPORATION

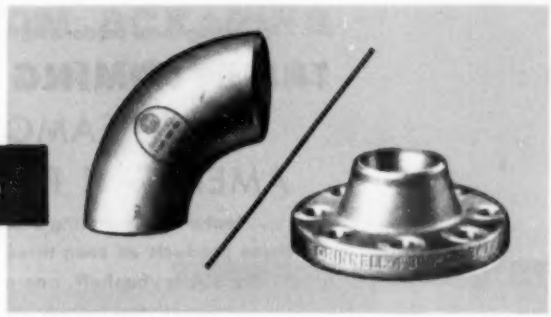
30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

Linde Trade-Mark

for trouble-free service



GRINNELL

STAINLESS STEEL WELDING FITTINGS and FLANGES

To help combat mounting costs in the installation and maintenance of piping systems where corrosive or certain other service conditions are involved, Grinnell offers a comprehensive range of welding fittings and flanges in stainless steel.

- **To prevent corrosive attack.**
- **To obtain adequate impact resistance at low temperatures and sufficient creep strength at high temperatures.**
- **To provide sanitary conditions.**
- **To avoid contaminating the product.**

Grinnell welding fittings and flanges are available in types 304, 347 and 316. These are in the chromium-nickel grades known as "18-8". The corrosion resistant properties of stainless steels are primarily due to the chromium content which ranges from 17% to 20%. The addition of nickel in ranges from 7% to 14% improves the corrosion resistance as well as the properties at elevated temperatures. A molybdenum addition of 2% to 3%, as found in type 316, increases the resistance to sulphurous and phosphoric acids, brine and hypochlorite solutions, and improves the general resistance to other corrosive liquids, as well as improving the physical properties at elevated temperatures. A columbium addition of approximately 0.4% to 1.0%, as found in type 347, creates non-susceptibility to carbide precipitation which can cause intergranular corrosion.

In addition to stainless steel, Grinnell offers welding fittings and flanges in carbon steel, nickel, Inconel, Monel, aluminum and brass.

Write for new booklet giving complete data on Grinnell stainless steel welding fittings and flanges. No obligation.

stainless steel welding fittings
Types 304, 347, 316

DESCRIPTION	SCHEDULE†	PIPE SIZE, IN.‡
90° Long Radius Elbow 45° Long Radius Elbow 180° Long Radius Return Straight Tee	5s, 10s, 40s, 80s	½ to 12
Reducing Tee	5s, 10s, 40s, 80s	¾ to 12
Cross (Straight and Reducing)	5s, 10s, 40s, 80s	1¼ to 12
Concentric Reducer Eccentric Reducer	5s, 10s, 40s, 80s	¾ to 12
Lateral (Straight or Reducing)	5s, 10s, 40s, 80s	1 to 12
Cap	5s, 10s, 40s, 80s	½ to 12
Lap Joint Stub End-Long	10s, 40s, 80s	½ to 12
Lap Joint Stub End-Short	5s, 10s, 40s,	½ to 12

† *5s is Featherweight, 10s Lightweight, 40s Standard, 80s Extra Strong.*
‡ *Larger sizes available on special order.*

stainless steel flanges

150 lb. and 300 lb. Steel Flange Standard *(Higher series available on application).*

DESCRIPTION	PIPE SIZE, IN.
Welding Neck Slip-on Lap Joint Threaded Socket Type Blind	½ to 24

150 lb. Corrosion Resistant Standard. *(For use with schedule 10s and 5s pipe. Rated at 150 psi at 500°F, 225 psi at 150°F, when used with full-faced gaskets).*

DESCRIPTION	PIPE SIZE, IN.
Buttwelding Slip-on Blind	½ to 12

GRINNELL
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • **Coast-to-Coast Network of Branch Warehouses and Distributors**

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

Presenting some outstanding "portraits" from

THE **LYCOMING** GALLERY OF FAMOUS AMERICAN PRODUCTS

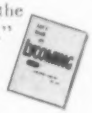
. . . featuring Lycoming's contributions to these products as seen through the eyes of Boris Artzybasheff, one of America's great contemporary illustrators.

Look closely—one of these achievements for America's industrial and military leaders may indicate how Lycoming can solve *your* metal-working problem.

See how these "portraits" help interpret Lycoming's abilities. See why you can depend on Lycoming's versatility of skills, extensive facilities, and well-rounded experience to meet your most rigid metal-working requirements.

Whatever your problem—whether you need creative engineering for "just an idea" or precision or volume production of a finished product—"Look to Lycoming!"

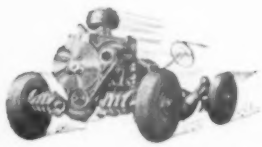
For a more complete story on Lycoming's varied abilities and facilities, write—on your company letterhead—for the interesting, illustrated booklet "Let's Look at Lycoming."



Presenting some of America's leaders who

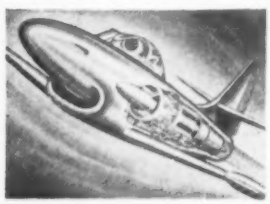
LOOK TO LYCOMING

AERO DESIGN AND ENGINEERING COMPANY
AMERICAN CAR AND FOUNDRY COMPANY
AIR MATERIEL COMMAND
BEECH AIRCRAFT CORPORATION
BENDIX AVIATION CORPORATION
CESSNA AIRCRAFT CORPORATION
THE CLEVELAND PNEUMATIC TOOL COMPANY
DOMAN HELICOPTERS, INC.
FOOD MACHINERY & CHEMICAL CORPORATION
FORD MOTOR COMPANY
GENERAL ELECTRIC COMPANY
GENERAL MOTORS CORPORATION—
CHEVROLET-AVIATION ENGINE DIVISION
DETROIT TRANSMISSION DIVISION
INTERNATIONAL BUSINESS MACHINES CORPORATION
KAMAN HELICOPTER CORPORATION
NAVY BUREAU OF AERONAUTICS
NEW IDEA FARM EQUIPMENT COMPANY
PIASECKI HELICOPTER CORPORATION
PIPER AIRCRAFT CORPORATION
PRATT & WHITNEY AIRCRAFT
RYAN AERONAUTICAL CORPORATION
SYLVANIA ELECTRIC PRODUCTS, INC.
THOMPSON PRODUCTS, INCORPORATED
U.S. ARMY ORDNANCE
WESTINGHOUSE ELECTRIC CORPORATION
WRIGHT AERONAUTICAL DIVISION
CURTISS-WRIGHT CORPORATION



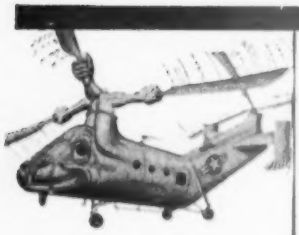
"Sinews" to give cars "go"

For vital automotive parts—precision-machined components that can "take it," year after year, leading *automobile manufacturers like* FORD, *have long looked to Lycoming.*



"Blasts" for jets

To precision-produce tough, unfailing major components that put the "blast" in its superb J-47 jet engine—GENERAL ELECTRIC *looks to Lycoming.*



How a helicopter hangs by its "elbows"

For flexible "elbows"—rotor assemblies that control the amazing maneuvers of its H-21 "Work-Horse" Helicopter—PIASECKI *looks to Lycoming* for precision production.

New "ticker" for tanks

For a dependable tank "heart"—500 horsepower's worth of rugged, air-cooled engine—U. S. ARMY ORDNANCE *looks to Lycoming*, pioneer in the air-cooled engine field.

How a jet engine runs on its "nerves"

To produce the auxiliary "nerve center" for its J-40 jet engine—a complex gearbox that transmits power to vital accessories—WESTINGHOUSE *looks to Lycoming.*

"Air horses" for lifesaving over the sea

To help swell the production of the mighty Wright-Cyclone engine—dependable "horses" for air-sea rescue work—CURTISS-WRIGHT *and the* U. S. AIR FORCE *look to Lycoming.*

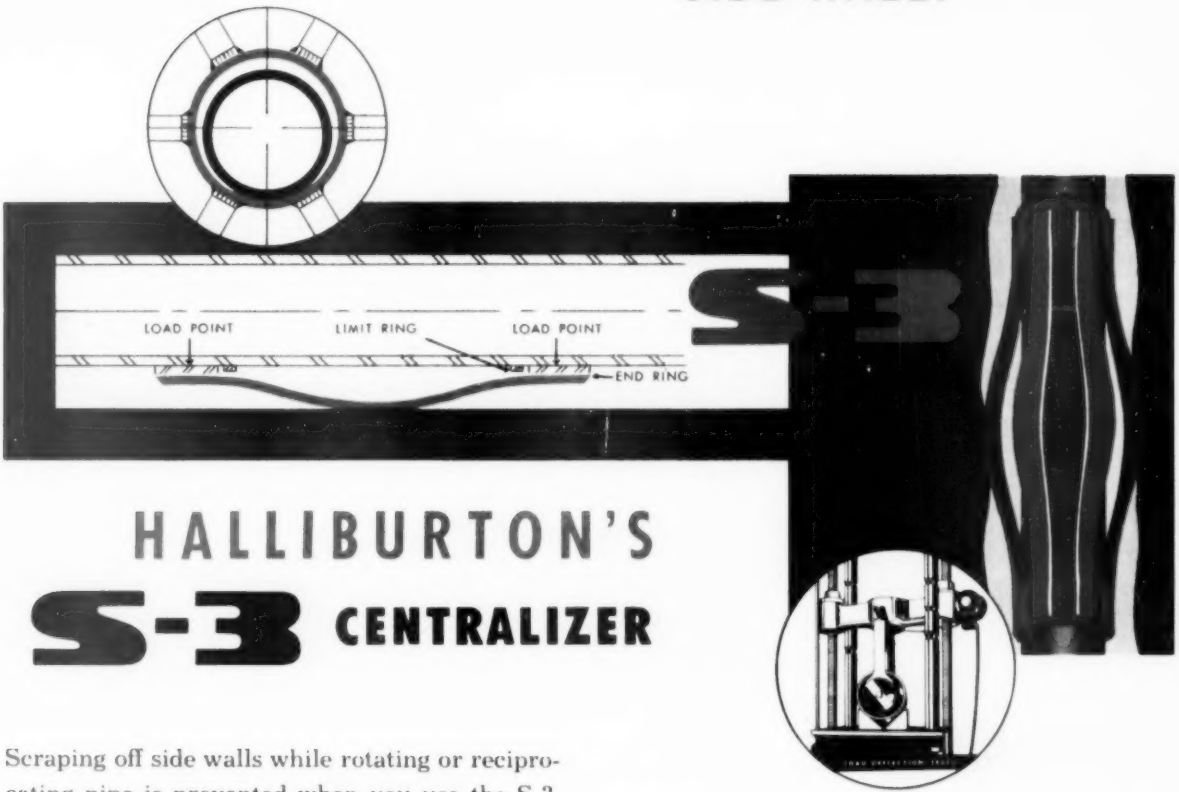
FOR RESEARCH • FOR PRECISION PRODUCTION

LOOK TO **LYCOMING**

Lycoming Spencer Division, Williamsport, Pa (AVCO) Bridgeport Lycoming Division, Stratford, Conn.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

KEEPS CASING FROM SCRAPING SIDE WALL!



HALLIBURTON'S S-3 CENTRALIZER

Scraping off side walls while rotating or reciprocating pipe is prevented when you use the S-3. Special heat-treated springs *center casing positively* – allowing a good cement job even where hole deviation is abnormal.

Having greater deflection resistance, proved by Halliburton's big Baldwin-Southwark testing machine, these steel springs never touch casing. The centering load is transmitted directly to sturdy end bands. Ample clearance between casing and the end bands minimizes drag on casing while rotating.

Halliburton's S-3 springs provide still another advantage for the operator who wants stronger cementing. There are fewer of them, therefore offering minimum resistance to free annulus flow between wall and casing.

The S-3 scores heavily as a valuable low-cost investment. Saves rigtime, too. No welding is required when latched over collars, and there is less welding of limit rings for selective spacing. Ordering and warehousing for the drilling program is simplified, too, because only one size S-3 is required for each casing O.D.

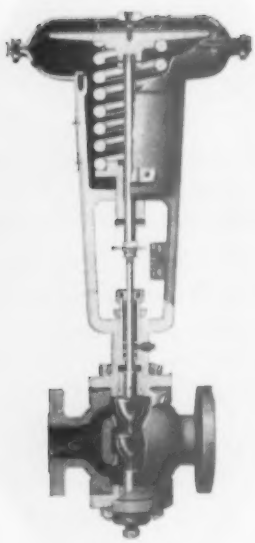
Next job, rely on the Centralizer that provides these extra advantages... for *positive centering* and more uniform cementing. It's backed by million job experience. Phone your nearby Halliburton representative. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

Meet the modern valve for modern process control

the new Honeywell Series 800



Look at these features:

- **SMALL AIR CHAMBER . . .**
  minimum volume of dead air assures fast response to control air signals.
- **TIGHTLY SEALED DIAPHRAGM . . .**
  extra thick, molded-in gasket around bolt circle prevents air leaks; reinforced construction gives high flexibility, long life.
- **STAY-TIGHT STEM LOCK . . .**
  won't separate under most severe vibration.
- **STURDY, ATTRACTIVE YOKE . . .**
  no useless weight, but plenty of strength; stands roughest handling. Pads on both sides of yoke facilitate mounting of auxiliary equipment.
- **CHOICE OF BONNET DESIGN . . .**
  screwed or bolted.
- **PACKING . . .**
  graphite-impregnated asbestos or shredded Teflon.

New Solid V-ported Disc for high-velocity service

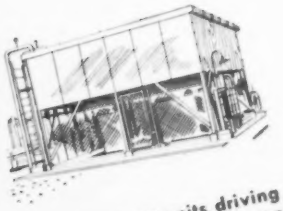
Now available with the Series 800 double seated line is this solid equal percentage disc. It's especially applicable to high velocities and high pressure drops; has better stability and resistance to erosion; minimizes noise. Rangeability up to 50 to 1.

Here's the new look—coupled with new performance standards—in diaphragm motor valves. The Honeywell Series 800 incorporates every feature of design that is demanded by the process control applications of today . . . and of tomorrow, too.

In response . . . sensitivity . . . reproducibility . . . overall performance . . . the Series 800 valve is the ideal partner of advanced instrumentation. It's available in a full range of styles and sizes. Get complete technical data today, by writing for Bulletin 800.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*
1904 Windrim Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
VALVE PRODUCTS
First in Controls



Cleveland CU units driving fans in an Oklahoma gas cooler. Cleveland Worm Gear Cooling Tower Drives are made in sizes 50 CU to 500 CU inclusive.

CLEVELAND driven cooler cools off natural gas

EFFICIENCY in this gas cooler depends upon steady operation of its heavy-duty fan. So to insure uninterrupted service regardless of weather and every other condition, an Oklahoma gas company equipped this booster station with four Cleveland CU worm gear speed reducers.

Cleveland CUs are especially designed and built for heat exchanger service—wherever fans are required to move large volumes of air efficiently. Outdoors or under shelter, no matter where located—driving air-cooled or water-cooled units—Clevelands are easy to install and maintain. They offer a minimum of trouble because they are properly designed and ruggedly built, with a minimum of moving parts.

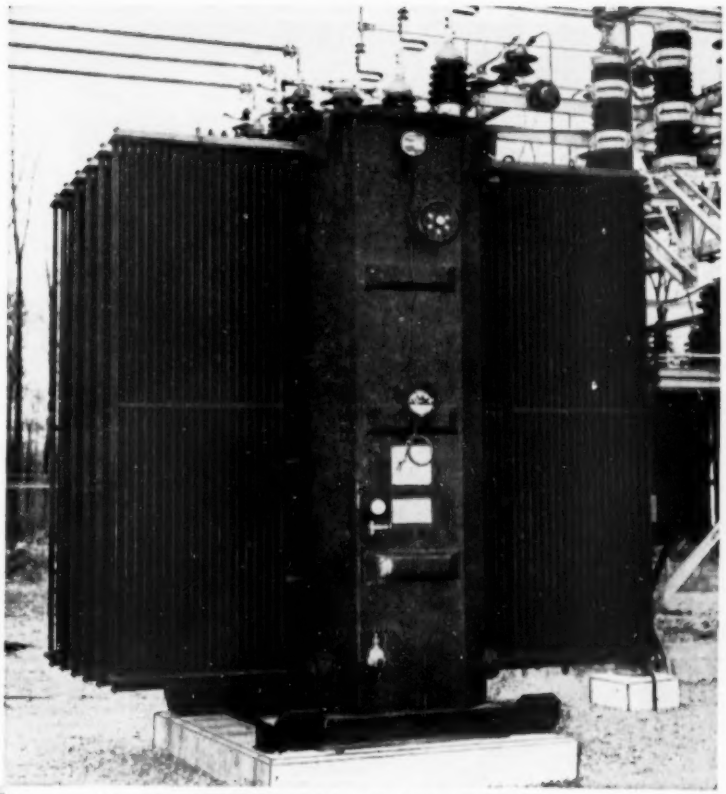
Why not get the Cleveland Cooling Tower Drive story first hand? See the Cleveland representative in your area. He's there to help you. Or, write for new CU Bulletin 135R. The Cleveland Worm & Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm & Gear
Speed Reducers

Wagner

Transformers used by Studebaker in new power distribution system planned for present and future needs



6000 KVA WAGNER POWER TRANSFORMER where power is received at 26.4 kv and is stepped down to 13.2 kv for distribution to the seven unit substations in the plant.

1000 KVA WAGNER UNIT SUBSTATION TRANSFORMER, at one of the five load centers that deliver 440 volt, three phase power to large machines and equipment.

New Jersey plant can convert from military to auto assembly production without extensive system changes!

The modern power distribution system at the Studebaker Corporation plant at New Brunswick, New Jersey has been planned with an eye to the future. While the plant is now manufacturing military jet engine parts, it will eventually become eastern auto assembly headquarters for Studebaker.

The power load is divided between seven load center substations, all equipped with Wagner Unit Substation Transformers, spaced 160 feet apart down the center of the building. In addition to insuring an adequate power supply for present purposes, this plan provides a dependable supply of power from short secondary feeders at any time in the future.

* * *

Why not discuss your next transformer installation with the Wagner engineer nearest you? There are Wagner branches in 32 principal cities. Bulletin TU-181 gives full information on Wagner Power Transformers, and Bulletins TU-13 and TU-56 tell about Wagner Unit Substation Transformers. Write for your copies.

WAGNER ELECTRIC CORPORATION
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

® Wagner Electric Corporation EST. WE 1891

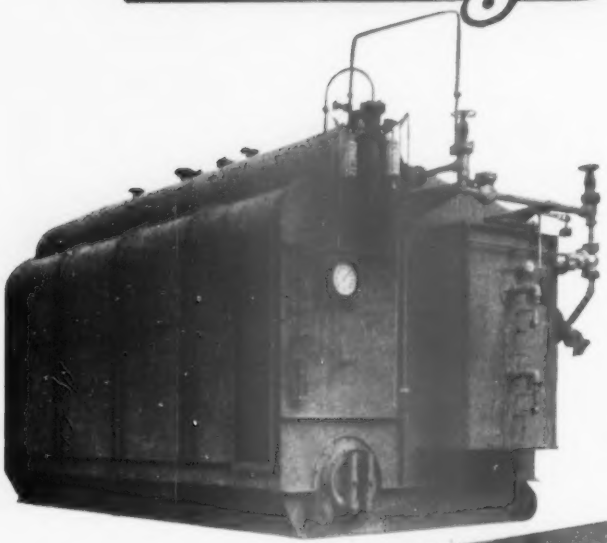
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

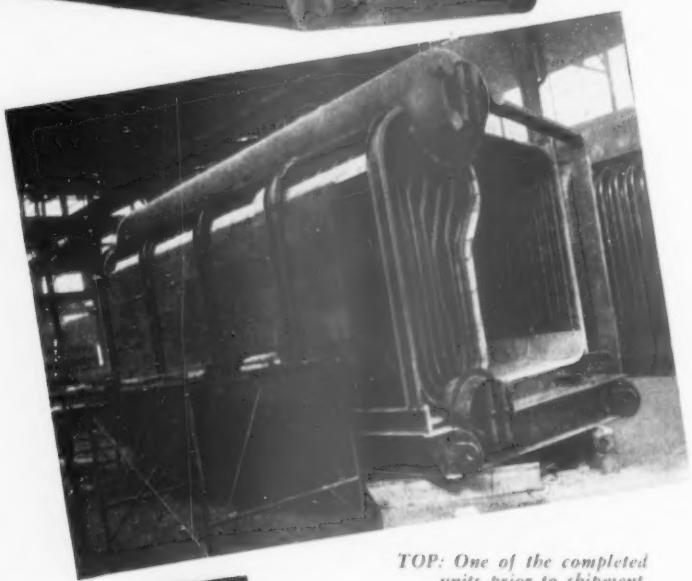
BRANCHES IN 32 PRINCIPAL CITIES

T53-9

Vogt

Gas Fired
PACKAGE UNIT
Steam Generators
selected by
PHILLIPS CHEMICAL CO.
Pasadena, Texas Plant





TOP: One of the completed units prior to shipment.

BOTTOM: Shop erection view shows tile and block insulation in convection wall; also main baffle tile and furnace floor tile.

Principal Data, Each Unit

25,000 pounds steam per hour capacity. Induced draft type.
Fusion welded steam and water drums designed for 425 pound S.W.P.
Completely shop assembled and required only the piping and gas outlet connections to place them in operation.
Fully steel encased for outdoor installation on a simple foundation.

•

**Vogt Steam Generators are available in bent tube types and straight tube forged sectional header types for solid, liquid or gaseous fuels. Bulletins on request.*

HENRY VOGT MACHINE CO.
Louisville, Kentucky

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland, St. Louis, Dallas, Charleston, W. Va.

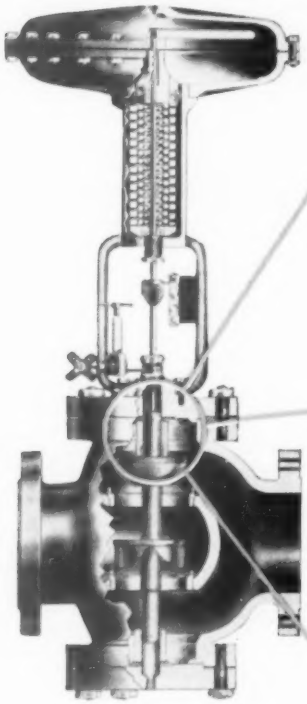
Have a preference... a special application?

There's A Standard Teflon Stuffing Box

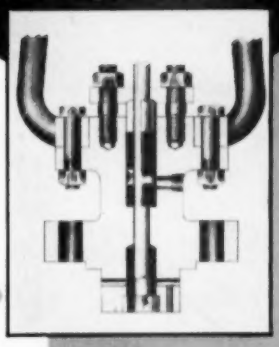
The use of Teflon in Climax Controls stuffing boxes is standard procedure with BS&B. There's a Climax Teflon stuffing box to meet any preference. Here, we show three of them as applied to Climax Diaphragm Control Valve Type 86. BS&B stresses correct stuffing box design because design has such a great effect on hysteresis. Any friction in the valve may result in improper operation and unsatisfactory service. To further overcome the threat of friction, the lower stems in all Climax Controls of this type are super polished.

Teflon resists almost all known corrosive fluids. It's self lubricating and means less friction. Spring loaded Teflon reduces maintenance which might normally result from packing nut being applied too tightly.

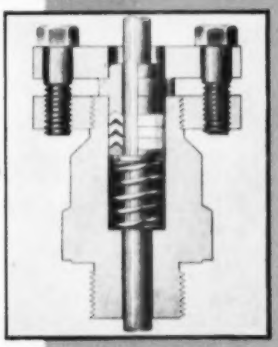
for the BS&B Climax Controls needed in your processing



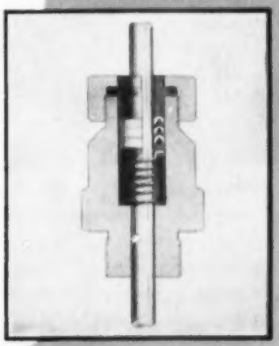
Teflon or Standard bolt stuffing box. *The top works or yoke of the valve is removable without disturbing the stuffing box. This stuffing box is applicable to Climax Controls Types 86, 73, 1286, 15, 115, and 1486.*



Bolt-down type, spring loaded Teflon *using CVU Ring. Available for, or present standard stuffing box can be converted to, the following Climax Controls, Types 86, 73, 1286, 1486, 125, 120, 128, and 58.*



Standard Packing Nut stuffing box. *Screwed down packing nut design assures minimum frictional lag and a minimum of maintenance. Features the dependable CVU Teflon Ring. Can easily convert old style valves using standard stuffing box to Teflon packed.*



The type of stuffing box you require depends on . . . (1) The fluid being handled (2) Individual maintenance problems. The interchangeability of Climax Controls stuffing boxes is highly important to both old and new users. Teflon stuffing boxes are standard with Climax...or conventional type stuffing boxes may be specified or interchanged with Teflon stuffing boxes in the field with a minimum of time and effort. Tell us what fluids you're handling and what your problems are...then let us make a recommendation—Write...

CLIMAX BS&B CONTROLS OUR 60TH YEAR

BLACK, SIVALLS & BRYSON, INC.

CLIMAX CONTROLS DIVISION, DEPT. 4-A11

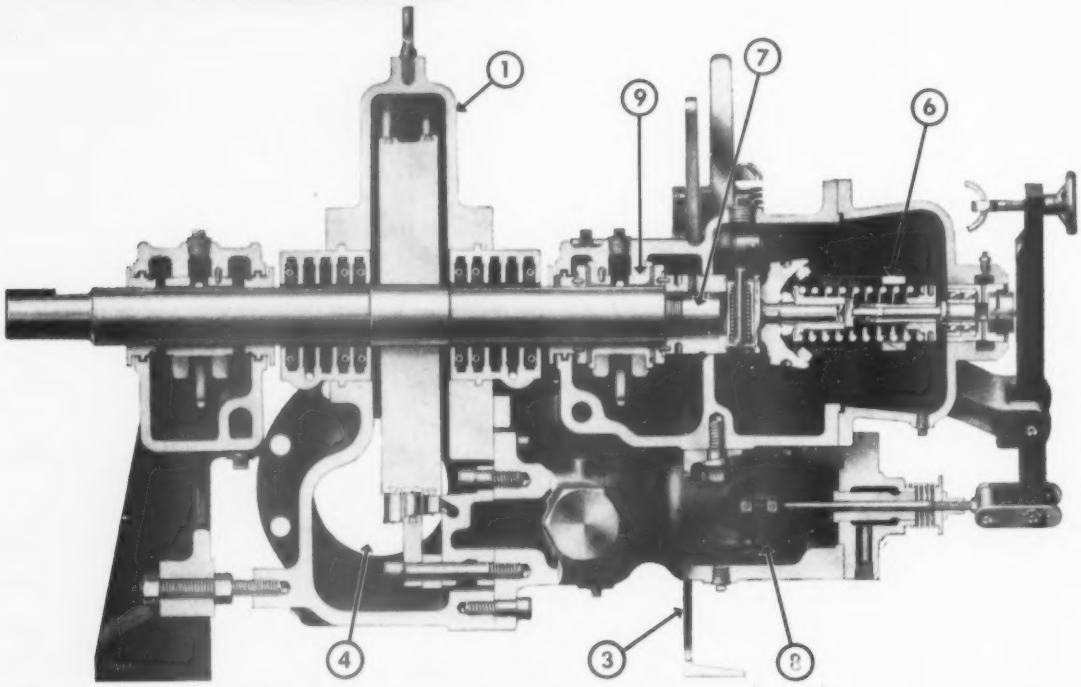
7500 East 12th Street **Kansas City 26, Missouri**

NEW DE LAVAL

HCB

SINGLE STAGE TURBINE

can be ordered from stock



1 Case and Cover Split Horizontally on centerline for ease of maintenance.

2 True Centerline Casing Support assures distortion-free radial expansion. *Not shown.*

3 Flexible Support at governor end provides for axial expansion.

4 Exhaust Opening either right or left side for installation flexibility.

5 Steam Strainer, protecting trip and governor valves, is *removable* for cleaning without breaking steam connections. *Not shown.*

6 Constant Speed Governor features governor weights pivoted around frictionless surfaces.

7 Complete Governor Assembly is now *replaceable as a unit.*

8 Balanced Single Seated Main Governor Valve has proportional flow characteristics for sensitive, positive control.

9 Shaft Locating Bearing of adjustable double collar type.

Horsepower: 100 MAX
Steam Pressure: 300 PSIG MAX
Steam Temperature: 550F MAX
Exhaust Pressure: 25 PSIG MAX
Speed: 4,000 RPM MAX
Steam Inlet: 2"–250# ASA FLG.
Exhaust: 6"–150# ASA FLG.
Weight: 1,200 LB

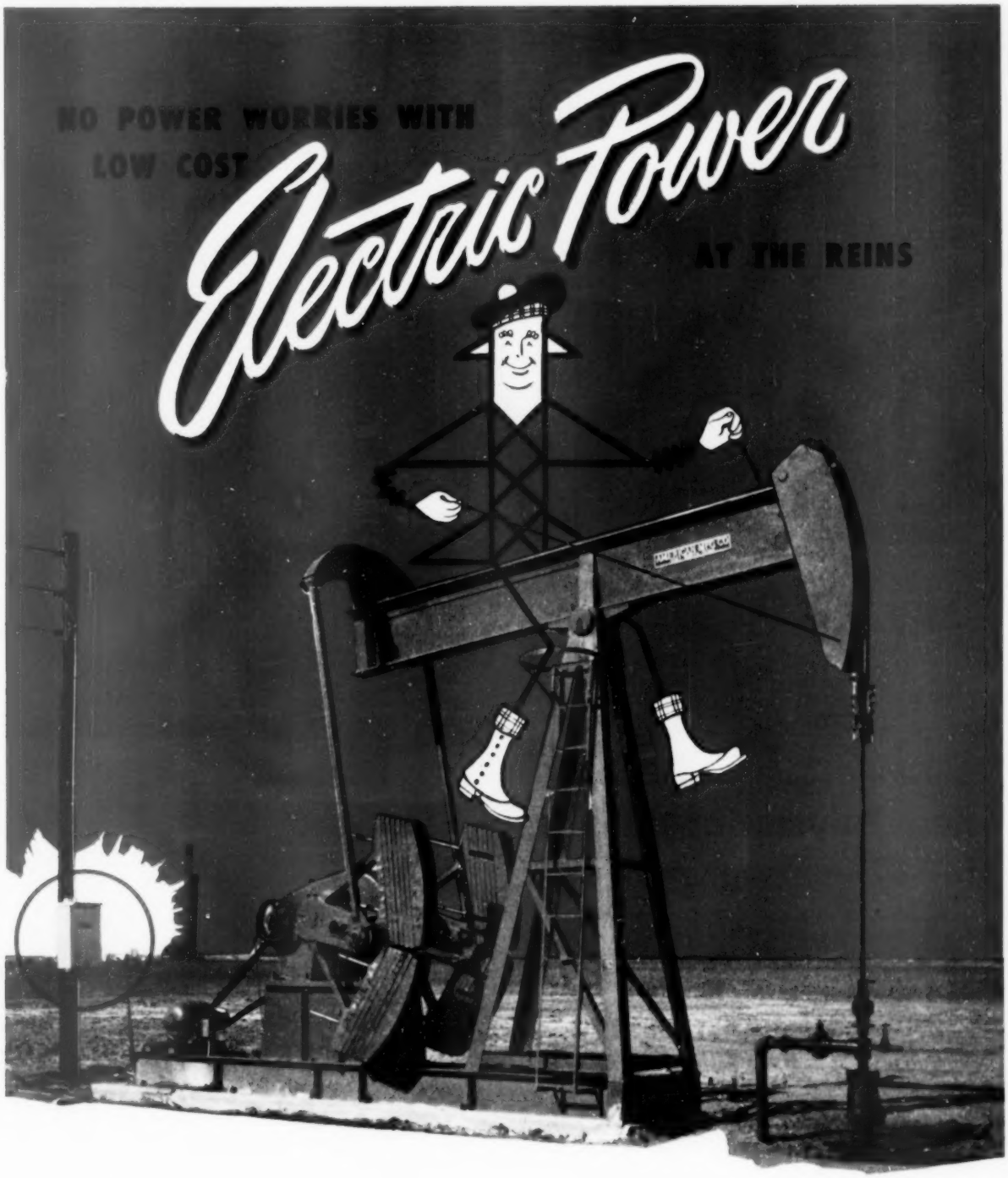
Here's the new De Laval HCB Single Stage Turbine which is now "on the shelf" . . . ready for immediate shipment. This mechanical drive turbine is simple, rugged, designed for long economical life and low maintenance. For example, note the true centerline casing support, the replaceable governor, the removable steam strainer. Investigate all the advantages of this versatile driver. It is ready to handle—*at low cost*—a variety of applications in your plant.

Send for new Bulletin 4206
which gives vital facts and figures

DE LAVAL *Mechanical Drive Turbines*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DLE205



PETROLEUM ELECTRIC POWER ASSOCIATION

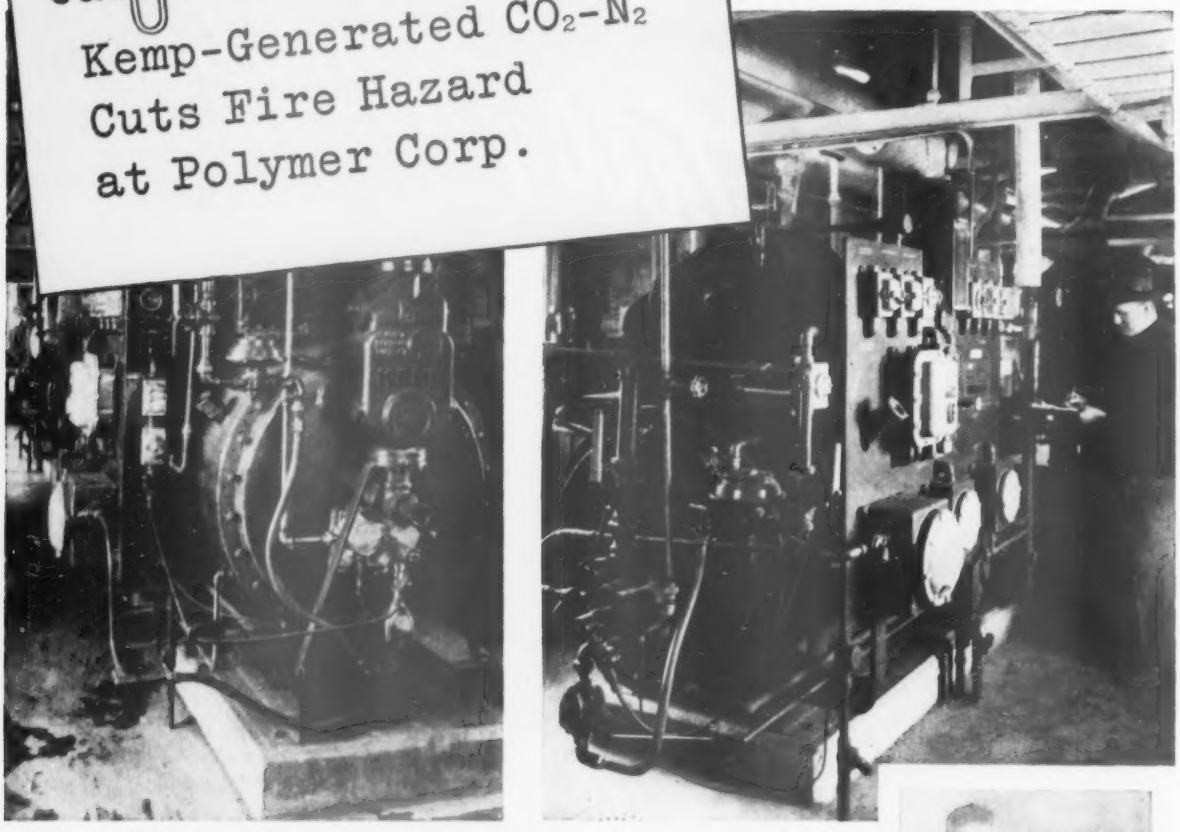
CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

With Low Cost Purchased Electric Power at the reins, oil field power worries end. This Electrically Powered pumping unit in West Texas, for example, gives the operator constant dependable service year around regardless of weather. And not only is LCP* dependable and clean, but it's *the most economical oil field power* obtainable. Hand over your power reins to LCP and end your own power worries. Contact your nearest Electric Power representative — *today!*

*Low Cost Power

Case No. 62

Kemp-Generated CO_2-N_2
Cuts Fire Hazard
at Polymer Corp.



How Polymer operated day and night for 10 years at maximum safety

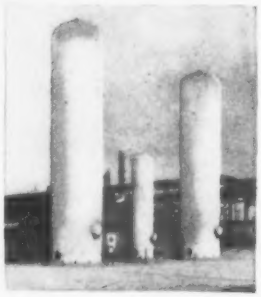
When Polymer Corporation, Ltd., Sarnia, Ontario, began operations in 1943, inventory included two Kemp MIHE Inert Gas Generators. Since that date, Polymer—and its Kemp equipment—has been operating 24 hours a day, 365 days a year. The huge quantities of man-made rubber and associated chemicals it produces—200,000,000 pounds during one year alone—reach, in one form or another, the four corners of the world.

Kemp Plays an Important Role

The high volatility of many of the ingredients used in this giant operation necessitates blanketing and purging vessels after use. It is in this step that Polymer employs Kemp Generators to assure safe, trouble-free performance. The gas they produce is piped to different operations over the entire company area—it *must* be clean! Kemp does the job—Polymer knows that it can depend on Kemp to deliver a *clean inert at a specific analysis, regardless of demand*. And every Kemp Generator is engineered for fast starts and easy operations that save *time* and *money*.

Kemp Can Do a Job for *You*

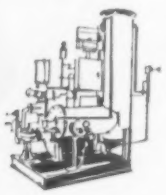
Kemp superiority is no accident. It is based on years of experience . . . on quality of design to meet specific problems. Every Kemp design features the Kemp Industrial Carburetor for complete combustion without tinkering or waste . . . for simplified installation and maintenance. Every Kemp design includes the latest fire checks and safety devices. If you have a blanketing or purging problem, contact Kemp engineers. They will be glad to study your situation and recommend the installation best suited to your needs. No obligation, of course.



Gas generator building from which inert gas is piped over 130 acres of company property at Polymer's Sarnia, Ontario, operation.

For more complete facts and technical information, write for Bulletin I-10 to: **THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.**

KEMP OF BALTIMORE



INERT GAS GENERATORS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • ADSORPTIVE DRYERS
SINGEING EQUIPMENT

PROVING GROUND

for oil field quality-

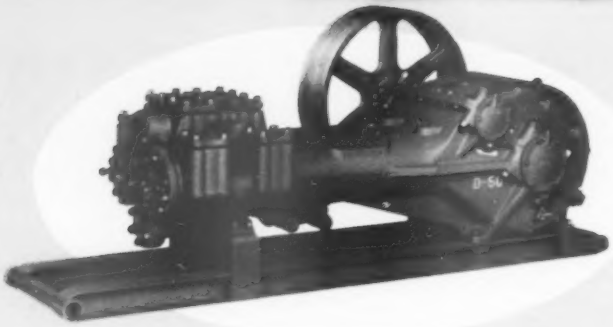
Almost any hour of day or night in one area of our shops at Toledo, you'll hear one of National's Ideal Power Slush Pumps going through its paces.

These mud pumps have just come off the assembly area, have been hooked up with fluid connections and electric drive and will run continuously for 12 hours. Starting at zero load and built up, over several hours, to maximum rated load, every functioning part of the Ideal Power Slush Pump is checked and recorded periodically. Gear tooth contact, bearing temperatures, lubricating system, and fluid end operations are all carefully watched during the maximum load test period.

This proving ground is duplicated at many places in National Supply plants . . . for wellhead equipment at Houston, for rigs and associated equipment at Toledo and Torrance, Calif., for tubular products at Pittsburgh . . . and is just one of the extra steps we take to assure National Supply quality on all oil field machinery and tubular goods that carry "National Blue."

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA



Ideal Power Slush Pump Type D-50 is rated for 50 hydraulic HP output

FOR ALL THE FEATURES IN

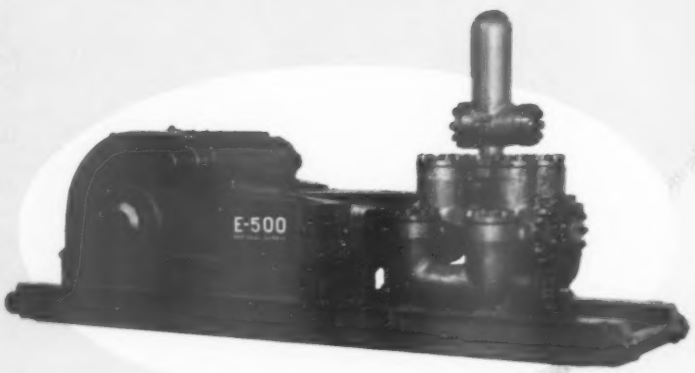
specify National's IDEAL Power Slush Pumps

National Supply's 40-year history and experience in mud pump design and manufacture is important to you, as a user, because it means that *all* field-tested improvements become part of Ideal Slush Pump design and construction.

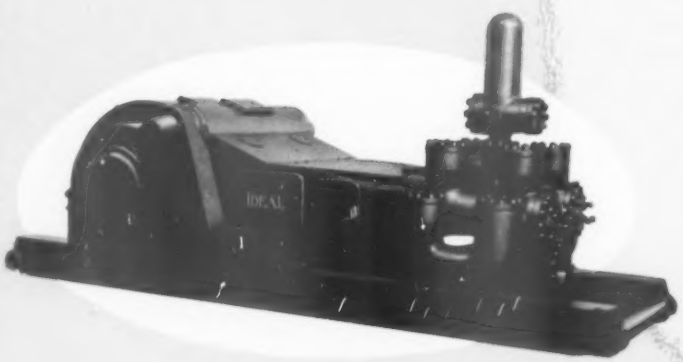
Through its world-wide staff of field engineers and product engineers, National Supply is constantly kept posted on changes in drilling mud requirements and mud pump performance in virtually every field. Such daily facts and figures motivate the constant improvement of Ideal Power Slush Pumps to assure modern quality and performance.

To suit virtually every drilling job, including jet bit drilling, Ideal Power Slush Pumps are manufactured in a complete range of sizes from 50 to 700 hydraulic horsepower output.

Be sure to have the latest facts on improvements in Ideal Power Slush Pumps—ask for recently published bulletins at the nearby National Supply Store or from the National Supply Representative in your area.



Ideal Power Slush Pump Type E-500 is rated for 500 hydraulic HP output



Ideal Power Slush Pump Type E-700 is rated for 700 hydraulic HP output

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

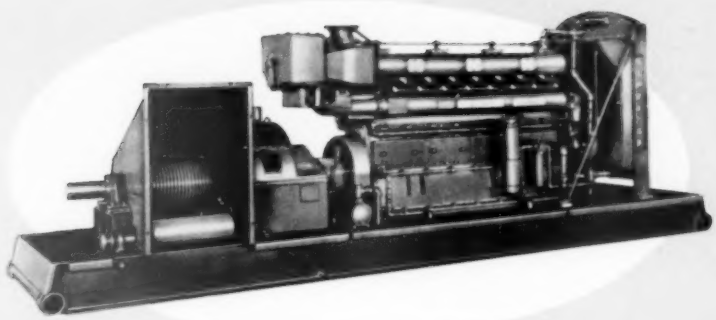
Division Offices: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa Torrance

Canada: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

Export: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C.2

NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT · SPANG STEEL PIPE · SUPERIOR & ATLAS ENGINES



MUD PUMP PERFORMANCE

and IDEAL Independent Pump Drives

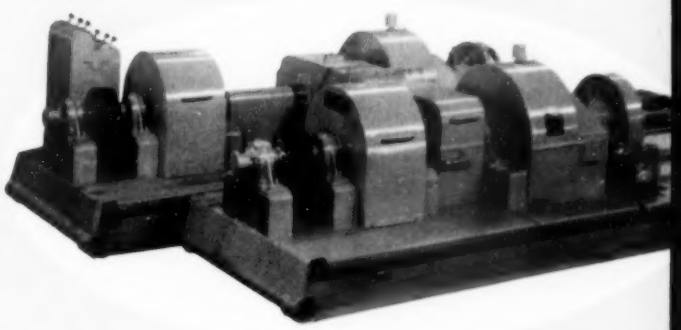
When drillers need increased fluid volume and velocity for the utmost in operating flexibility, Ideal Independent Pump Drives are recommended.

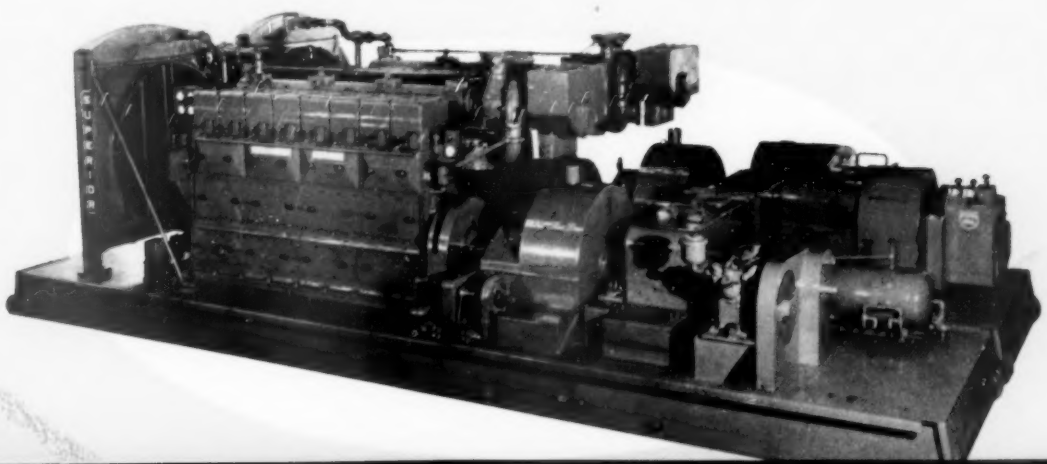
Sectionalized in the same manner as Ideal Consolidated Rigs and Drive Groups for mobility in the field, Ideal Independent Pump Drives are made in both single and dual engine types for the complete range of Ideal Pumps.

Completely flexible in applications, Ideal Independent Pump Drives feature—

- In-line and 90° angle drive.
- Engine clutch power take-off with single or 2-speed transmission for smaller pumps.
- Fluid drive (Ideal-Gyrol), torque converter or air-actuated (Airflex) clutch with V-belt, or chain drive.
- Dual-pump, dual engine combinations arranged for separate or tandem pump operation with one or two engines.

You'll find complete basic information on Ideal Independent Pump Drives in the Composite Catalog. For application details to meet specific requirements, contact National Supply.





to get maximum performance

out of your present mud pumps–

USE IDEAL FLUID END PARTS

Reflecting the same careful research and development in materials and methods that is typical of all National Supply oil field equipment, Ideal Fluid End Parts are precision made under strict manufacturing standards to give exceptionally long service life under varying slush pump operations.

Available for use on either Ideal or other makes of slush pumps, Ideal Fluid End Parts will enable you to realize the full benefits of preventive maintenance programs for lower pump operating costs in the field.

Important, too, is the fact that Ideal Fluid End Parts are specially packaged to insure factory-checked precision when you install them. Look for the bright blue and yellow label of quality today. Ideal Fluid End Parts are stocked by National Supply Stores in the United States and Canada and are available abroad through the Export Division of National Supply.

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

Division Offices: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

Canada: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

Export: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C.2

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT · SPANG STEEL PIPE · SUPERIOR & ATLAS ENGINES

Double Your Drying Capacity!

S/V Sovabeads Increase Dehydrator Efficiency Almost 100%

Yes, it's true—S/V *Sovabeads* will almost *double* the efficiency of your dehydrator units—maintain this efficiency at temperatures as high as 120° F.! And look at these other advantages:

S/V Sovabeads provide a longer desiccant bed life. They eliminate caking . . . reduce channeling, dusting and pressure drops. Reactivation is quick, easy and economical.

* * *

Why wait to improve *your* dehydration operations? Call your Socony-Vacuum Representative today for full information about S/V Sovabeads.

SOCONY-VACUUM
. . . process products

Process Products

SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4, N. Y., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

PROGRESS today in the power, processing and construction industries frequently depends upon new and varied types of heavy metal equipment.

Designing and building this equipment has long been an Alco specialty. From Tulsa to Trieste, from Pittsburgh to Palembang, Alco products ranging from 4-in. welded steel pipe to mammoth pressure vessels are giving outstanding service in all types of industrial installations.

This wealth of experience—applied by skilled engineers and craftsmen working with modern facilities—enables Alco to design and fabricate heavy equipment to meet rigid specifications.

Select your toughest heavy-equipment problem —then send it to your nearest Alco Products Sales Engineer. He'll quickly show you how Alco can produce the answer you've been looking for.

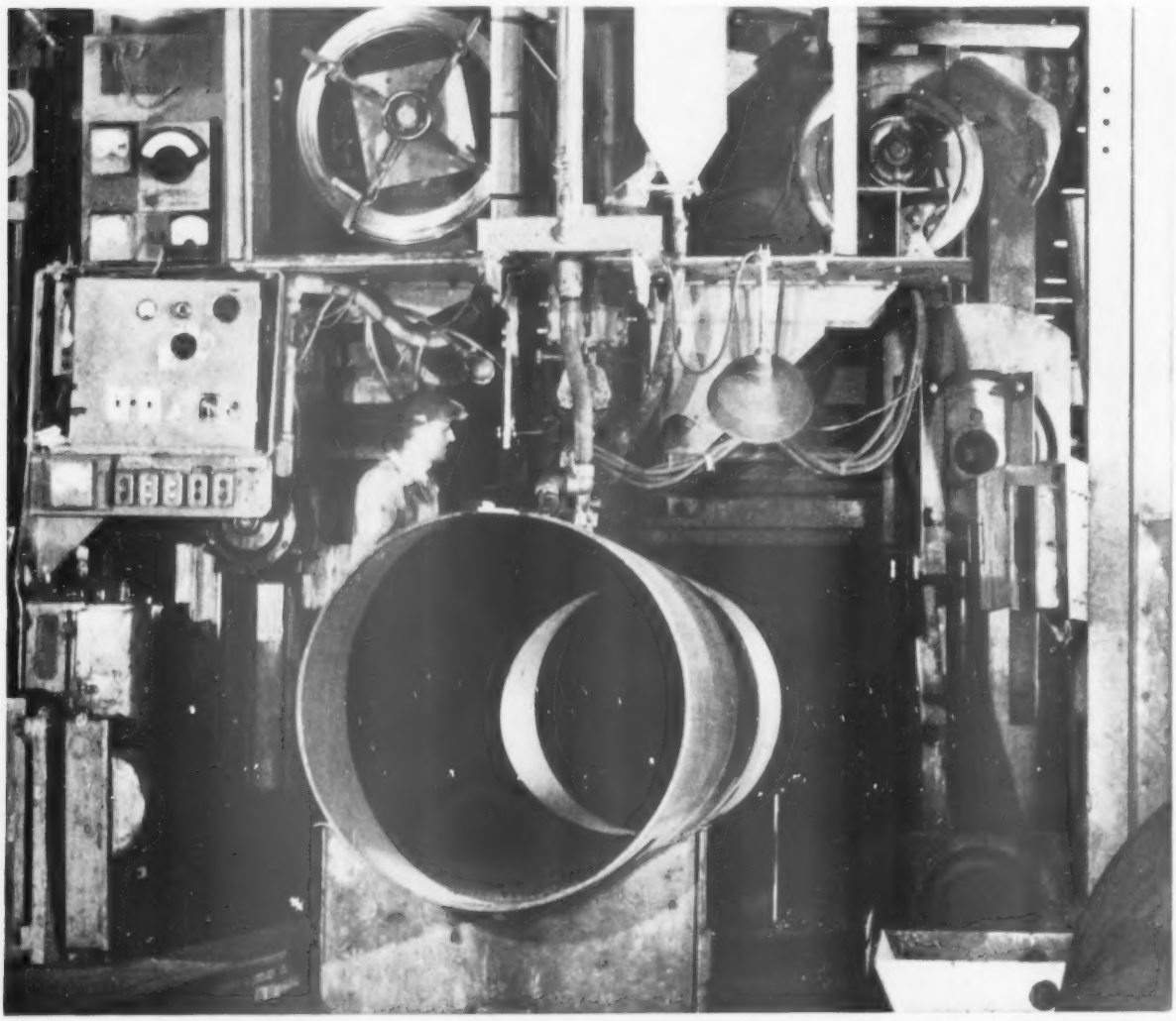
Alco Products Sales Offices are located in New York, Chicago, Dunkirk, Los Angeles, Kansas City, Houston, Tulsa and Beaumont.

Alco speeds progress in

Answers to

Alco

ALCO'S MODERN PRODUCTION FACILITIES, designed to handle economically many difficult metal-fabricating operations, include this automatic submerged-arc welding machine. Welds made on this machine must pass the most rigorous leak tests ever devised for commercial welding.



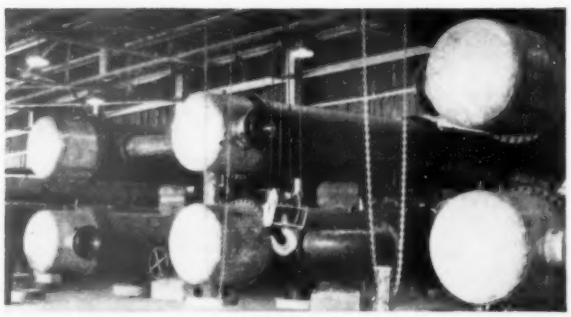
power and petroleum, chemicals and construction, with...

New Industrial Problems

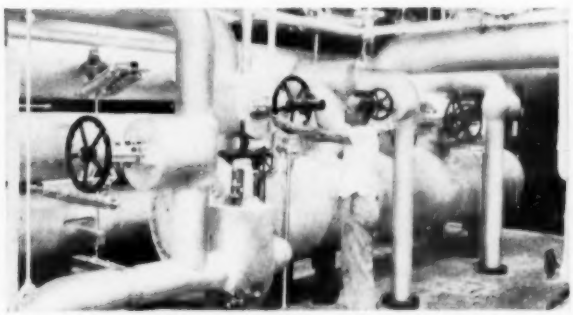
ALCO

ALCO PRODUCTS DIVISION

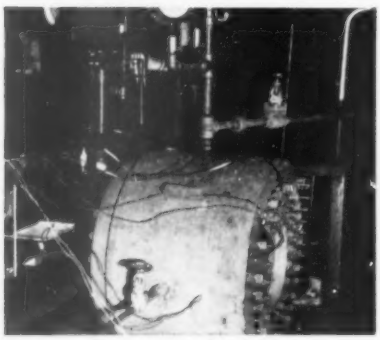
AMERICAN LOCOMOTIVE COMPANY • DUNKIRK, NEW YORK



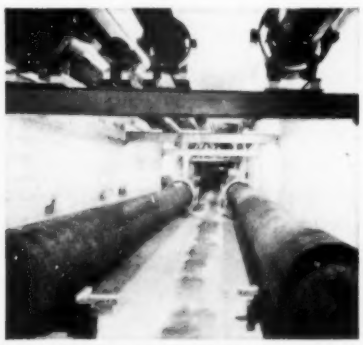
CUSTOM-BUILT HEAT EXCHANGERS ready for final piping in Canadian Chemical Company, Ltd.'s $55 million plant now under construction near Edmonton, Alberta. These units are among the more than 200 special reboilers and heat exchangers being supplied to the new Canadian plant by the Montreal Locomotive Works, Ltd., an Alco affiliate.



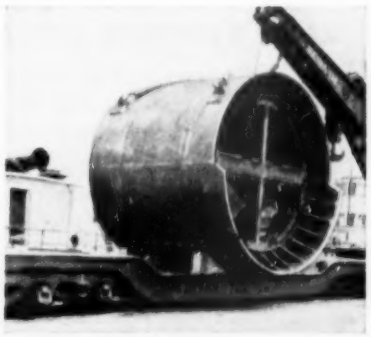
ALCO FLEX-TUBE EVAPORATORS incorporating many new features help boost efficiency at Carolina Power and Light Company's new 150,000 kw plant at Goldsboro, N. C. These specially designed Alco units produce vapor containing one part per million or less of mineral solids. Make-up to the system has been found to be less than one-half of one per cent.



NEW HIGH-PRESSURE CLOSURE, shown here during high-temperature tests, is typical of the many heavy-equipment improvements developed by Alco engineers for service throughout industry. (Reprints of article, "Engineering Development of Alco's New High-Pressure Closure," available upon request.)



ALCO WELDED STEEL PIPE was furnished for the chilled water lines in the U. S. Government's new $4\frac{1}{2}$ million walk-through tunnel, part of a Capitol Power Plant improvement project, now under construction at Washington, D. C. The 30-in. main lines (on tunnel floor) total about 9,280 ft., branch lines about 1,200 ft.



GIANT TUNNEL SHIELDS illustrate the variety of special heavy-metal equipment designed and fabricated by Alco for power, petroleum, chemical and construction companies the world over. Other items built by Alco to meet strict specifications range from tar stills to stripping towers, cement kilns to jet-engine containers.

AEROFIN

Heat-Transfer Surface

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

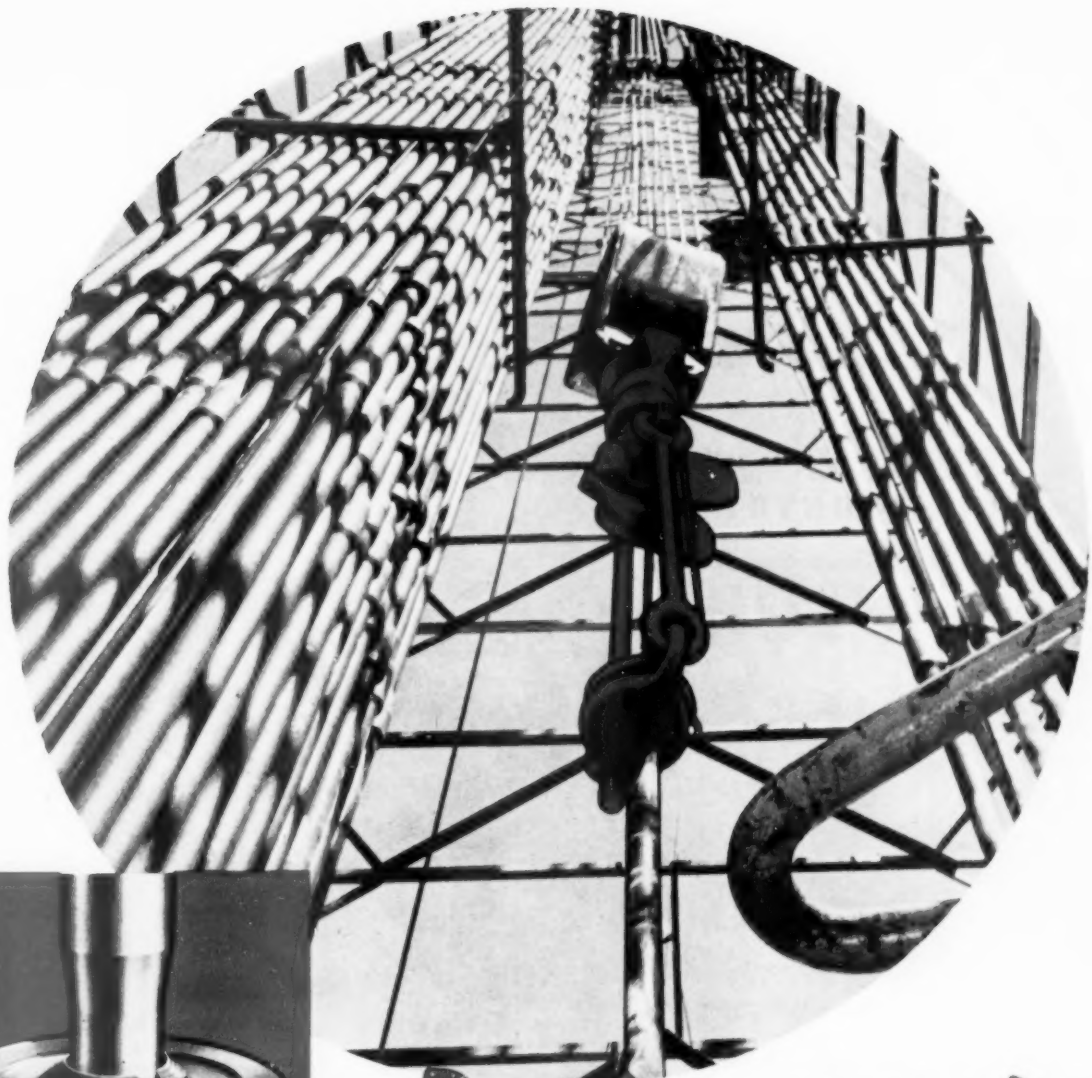
- **High Efficiency**
- **Long Service Life**
- **Low Maintenance Costs**

You are assured of high efficiency in heating or cooling — long service life — low maintenance and service costs, when you specify Aerofin extended-surface heat exchangers.

The reason is obvious: Aerofin makes heat exchangers *exclusively* — offers you the results of unequalled experience, unequalled production facilities, unequalled materials testing and design research — and the guidance of a complete, highly skilled engineering staff, at the plant and in the field.

For the most practical solution to your heat-exchange problem, ASK THE AEROFIN MAN.

AEROFIN CORPORATION 410 South Geddes St. SYRACUSE 1, N. Y.



Red Iron at work

FOR OHIO OIL COMPANY ON WORLD'S DEEPEST WELL

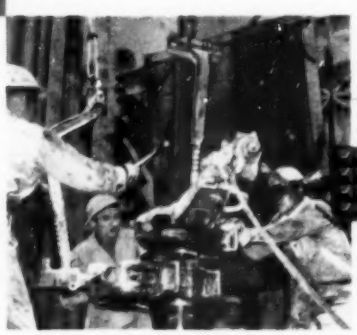
BJ tools carried the load . . . a long way, a lot of pipe, but a BJ '4300' Hook, BJ Weldless Links, and a BJ Type BB Elevator had the stuff to handle this record-smashing probe for oil.

PB rubber did it

There were miles of pipe to be wiped . . . in "rubber-eating" oil base mud. *PB Oil-Resistant Pipe Wipers were selected for this rugged work!*

BJ tongs took the "make and break"

2 years of drilling, 4 miles of pipe . . . plus emphasis on coring . . . meant more round trips. These BJ Type B Tongs and BJ Tong Dies stood the test.



ON THE WORLD'S RECORD SETTER OR ON EVERYDAY DRILLING . . .

You're way ahead —with BJ Red

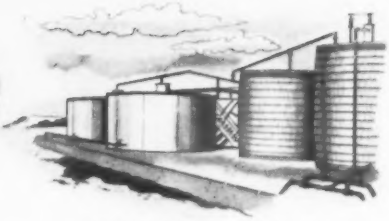
Byron Jackson Co.

Since 1872

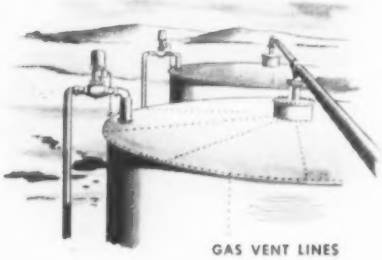
LOS ANGELES • NEW YORK • FORT WORTH • HOUSTON

*Only Carlon**

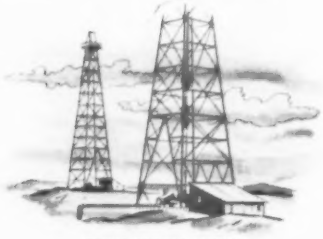
FOR OIL COUNTRY PIPING



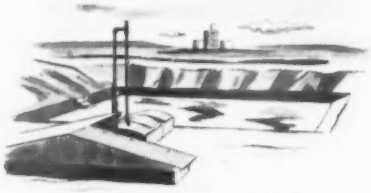
LEAD AND GATHERING LINES



GAS VENT LINES



FRESH WATER LINES



SALT WATER LINES AND TUBING

LEAD LINES AND RISERS

Specify **Carlon** plastic pipe for oil piping that completely resists corrosion. **Carlon** is immune to the corrosive effects of salt water, crude oil, sour crude, and corrosive earth as well as rot, rust and electrolytic action. **Carlon** lasts longer on every job . . . practically eliminates replacement and maintenance.

Carlon can be installed faster. No special tools or cumbersome rigging equipment is required.

Permanent leakproof connections can be made to plastic or existing metallic systems.

Only ⅛th the weight of steel pipe, **Carlon** can be transported easily. Several lightweight sections can be carried by one man... less time is needed for installation work.

Install oil piping that's corrosionproof . . . install piping faster . . . easier . . . Specify **CARLON** plastic pipe for all oil country piping.

* The First REAL PIPE that is Plastic • BUY THE PIPE WITH THE STRIPE!

1544-CP

Send today for literature.

CARLON
CP
THE PIPE WITH THE STRIPE

CARLON PRODUCTS CORPORATION

Pioneers in Plastic Pipe

10201 MEECH AVE. • CLEVELAND 5, OHIO

CARLON plastic pipe is produced in Texas, Colorado, Ohio, Oregon, North Carolina and Acton, Ontario, Canada.

You're sitting on top of the world in the AUTOCAR V/8

The new Autocar V/8 is giving truckers a new outlook on profitable transportation. The smooth performance of its great 200 horsepower engine steps up hauling schedules as much as 25 percent. There's nothing to touch it for making light of heavy loads. You should read the booklet on why the V/8 idea has every trucker talking. Send in the coupon for your copy.

AUTOCAR TRUCKS

THE WHITE MOTOR COMPANY
AUTOCAR DIVISION, ARDMORE, PA.

Factory Branches and Distributors from Coast to Coast in the U.S. and Canada

Export: Drexel Building, Philadelphia 6, Pa., U.S.A.

The White Motor Company
Autocar Division, Ardmore, Pa.
Please send me the Autocar V-8 Booklet.

Name_____

Company name_____

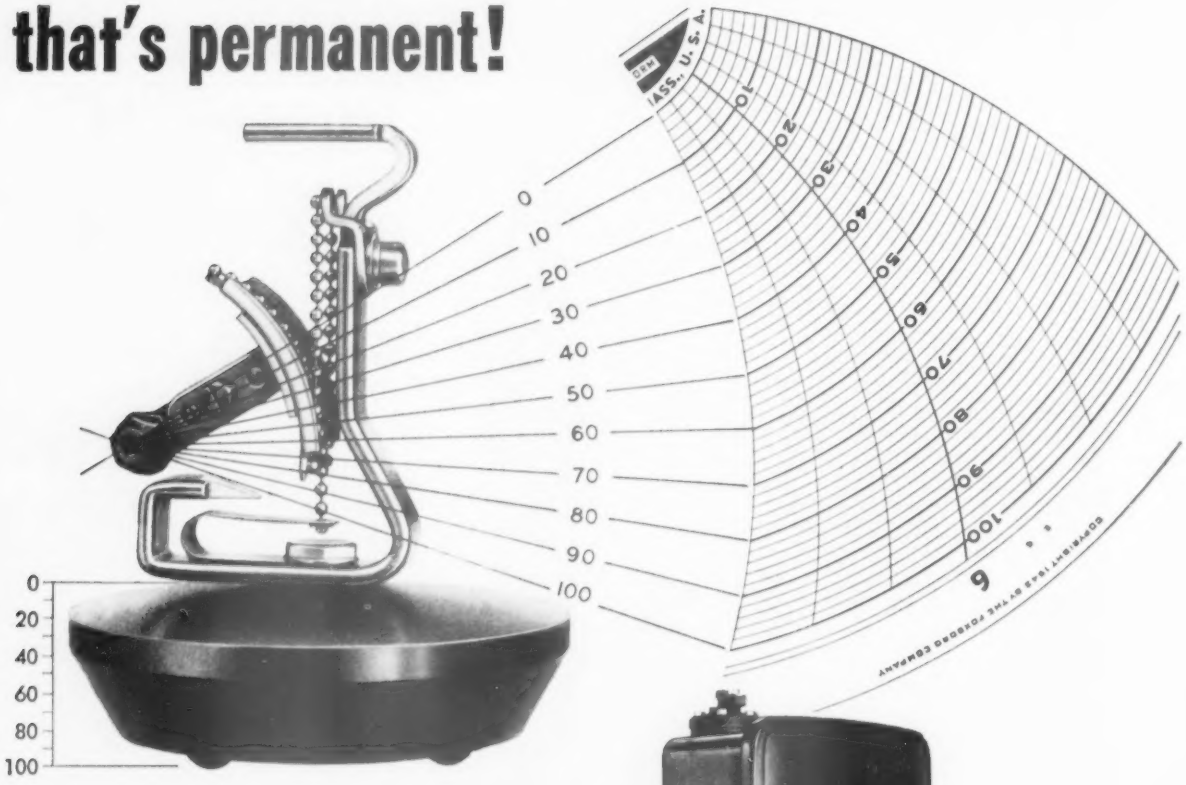
Address_____

Number of trucks in fleet_____

Type of operation_____

19-1

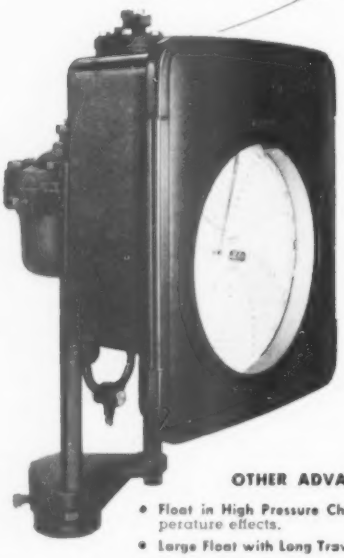
Full-scale meter accuracy that's permanent!



Exclusive Segmental Lever Design Gives Linear Transmission from Float to Pen Point . . . No Angularity Errors

A basic-design feature of Foxboro Flow Meters insures permanent calibration at all readings on the scale, by eliminating angularity errors and lost motion. The exclusive Segmental Lever drive transmits vertical motion of the float to the pen in positive, linear relationship. Its stainless steel ball chain runs free and true, regardless of meter alignment.

This is only one of several better-engineered features that have made Foxboro Flow Meters the unqualified choice of industries wherever dependability and "cash-register" accuracy of metering are important. Available in rectangular and circular case models. Write for complete story in Bulletin 460. **The Foxboro Company, 6011 Neponset Avenue, Foxboro, Massachusetts, U.S.A.**



OTHER ADVANCED FEATURES

- **Float in High Pressure Chamber** minimizes ambient temperature effects.
- **Large Float with Long Travel** gives high-power pen drive.
- **Sure-Seal Check Floats** with positive-seating ball plugs submerged in mercury prevent sticking, leaking, corrosion. Will not blow mercury.
- **Pressure Seal Bearing** is friction-free, completely leak-proof, interchangeable. No stuffing box. No lubricator.
- **Self-aligning, Union-Coupled U-Bend** — No gaskets. Fully-adjustable plug gives calibrated damping, directed drain.

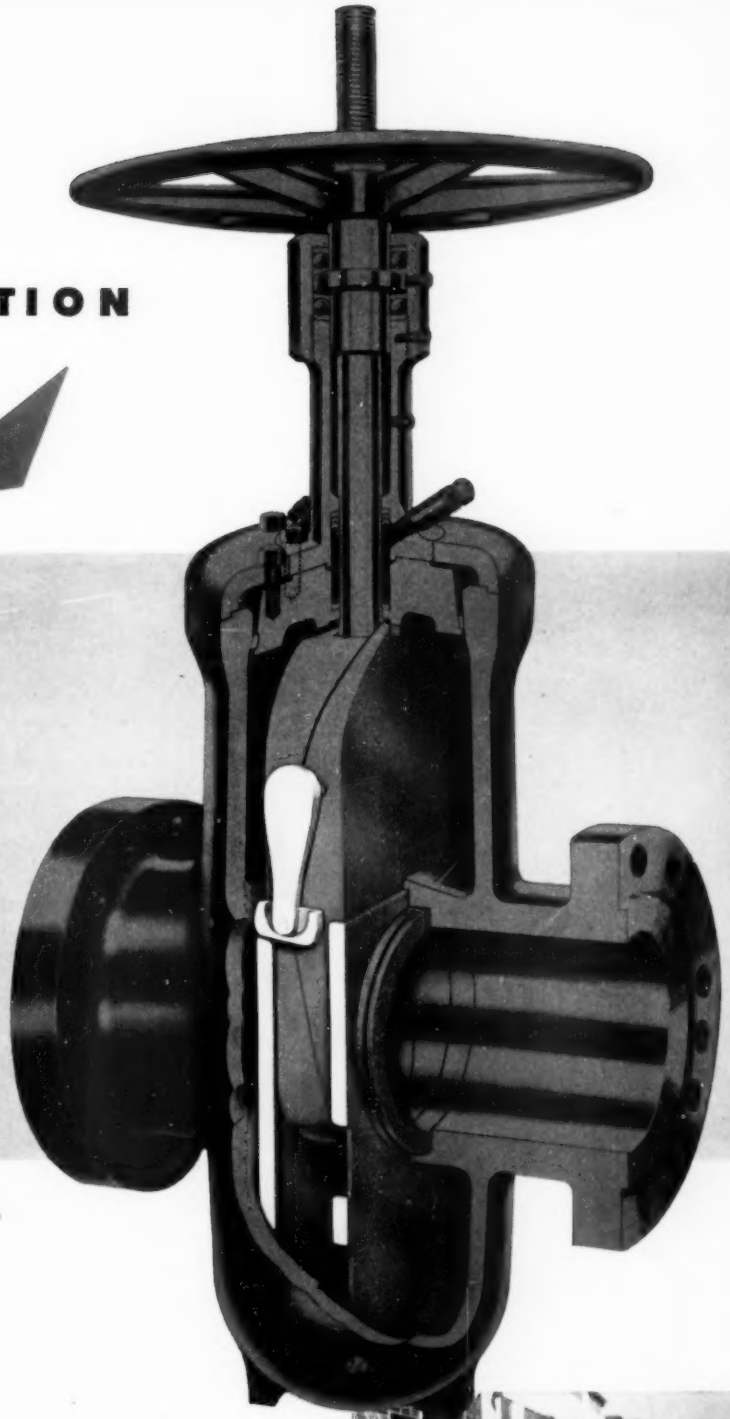
OVER 100,000 FOXBORO FLOW METERS WITH SEGMENTAL LEVER ARE IN USE TODAY

FOXBORO REG. U. S. PAT. OFF.

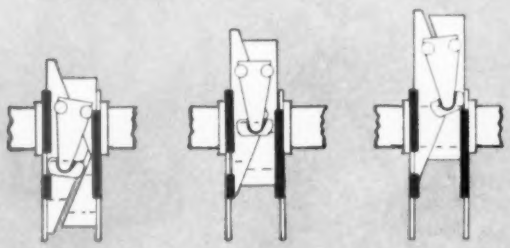
First in FLOW METERS

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

EXCLUSIVE LEVERLOCK ASSURES POSITIVE OPERATION in W-K-M VALVES



Leverlock action guarantees that W-K-M Valves always open and close efficiently. It controls neutral position of the gate and segment while opening or closing the valve . . . permits expansion of gate assembly ***only*** at proper time for seating in opened or closed position . . . assures positive controlled gate and segment pressure against ***both*** the upstream and downstream seats.



Gate and segment in closed position. | Neutral position. | Completely open.

The basic W-K-M Through Conduit Design and expanding gate have proved unequalled in the most severe tests. These, combined with Leverlock operation, no surge operation, simple maintenance, quick overhaul in the field, make W-K-M Pipeline Valves top standard for the industry. When you want dependable valve performance, specify W-K-M Valves all the way.

W-K-M COMPANY
P. O. Box 2117 Houston 1, Texas
2330 E. 8th St., Los Angeles, Calif.
Export Office: 30 Rockefeller Plaza, New York, N. Y.

W-K-M Valves

AL SCHMIDT

How Would You Go About Taming a Giant?

FOR MILLIONS OF YEARS the Giant slept.

In 1863, Man disturbed his mighty slumber, tamed him and put him to work for the good of all.

The Giant was called Petroleum.

How did enterprising men go about harnessing this stupendous new source of energy?

Here is how they did *not* go about it:

They did *not* turn the problem over to a government agency.

They did *not* say, "Whale oil is good enough. Why bother with this newfangled stuff?"

They did *not* say, "Too many problems involved. Too many risks. We might lose our shirts."

They *did* get to work and promote risk capital for drilling.

They *did* make this new source of energy available to all the people.

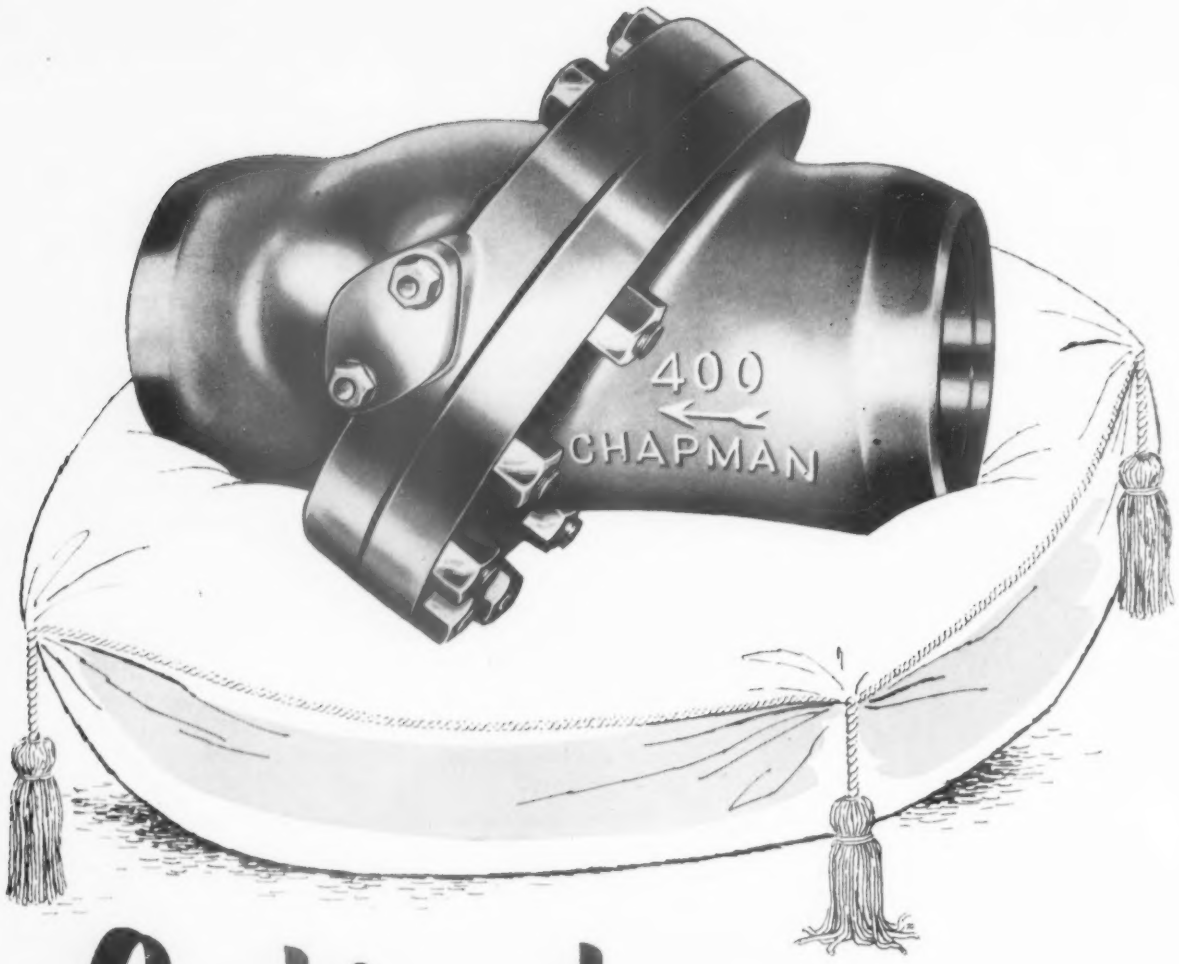
They *did* seek—and find—new ways to put the Giant's talents to work making hundreds of new products, creating thousands of new jobs.

Among these energetic giant-tamers were men of Cities Service. They had begun as processors of whale oil. They were quick to see the possibilities of "rock oil." They were among the first to study the sciences of combustion and petro-chemistry.

The petroleum Giant is now a docile servant of mankind. It has made our lives easier in countless ways. But Cities Service researchers say it has muscles it hasn't even used yet!

CITIES SERVICE

Quality Petroleum Products



Cushioned

to a drop-tight seat...

... that's why these unique

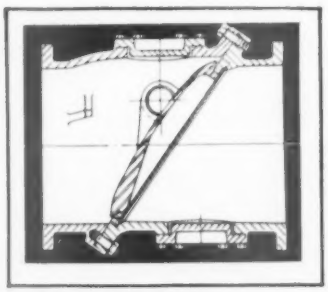
CHAPMAN

***Tilting Disc* CHECK VALVES**

cut head-loss to lowest levels

The Chapman Valve Mfg. Co.

INDIAN ORCHARD, MASSACHUSETTS



Here's what Chapman means by "Cushioning:"

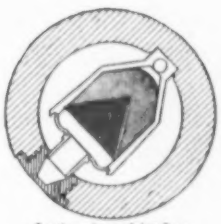
This specially designed, "air-foil" disc balances perfectly in open position . . . then drops easily to closed position (cushioned by the flow). No jarring or slamming, in usual pipe-layouts. Write for bulletin.

CHAPMAN (TILTING DISC) **CHECK VALVES**

Shaped-Charge Principle of DU PONT JET PERFORATORS boosts oil production

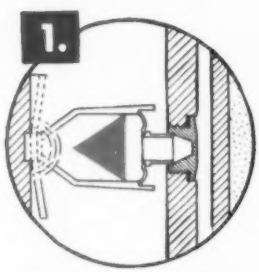
Du Pont Jet Perforators are high-explosive charges designed specifically to perforate oil-well casing and penetrate far into the surrounding formation. They are a logical peacetime application of so-called "shaped charges" developed during the war for penetration of armor plate and concrete fortifications. They are made in several different sizes for use in casings of various diameters.

Du Pont Jet Perforators are lowered into the well inside leakproof tubular steel carriers on a coaxial conductor cable. When the carrier reaches the desired depth, the perforators are fired simultaneously by an electric current from the shooting truck, insuring a symmetrical pattern.

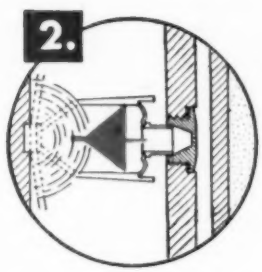


Section view of Jet Perforator inside carrier

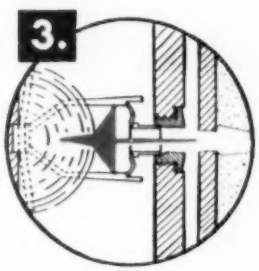
HERE'S HOW THEY WORK:



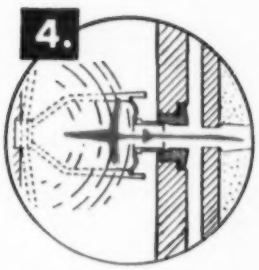
Detonating fuse is located at rear of Jet Perforator. Electric current detonates fuse, initiating in turn explosion of perforator.



High pressure developed by explosion collapses conical copper liner progressively from apex to base and pulverizes plastic case.



Like toothpaste squeezed from a tube, a jet of copper particles is squeezed from the inner surface of the cone as it collapses.



As individual particles lose energy in penetrating casing, cement, and formation, succeeding particles continue to "make hole."

WHY OILMEN PREFER THEM. More reliable, cleaner perforations assure passageways for oil to enter casing . . . materially deeper penetration helps getting through "mud damage" zones . . . maximum performance without rigid dimensional tolerances in carrier . . . downtime cut up to 50% . . . no damage to casing . . . sure perforating at temperatures above 300°F. . . . no burring or obstructions left in casing . . . *all sound reasons for specifying Du Pont Jet Perforators the next time you need perforating!* E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

Du Pont Jet Perforators

A Product of Du Pont Explosives Research

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING

. . . THROUGH CHEMISTRY

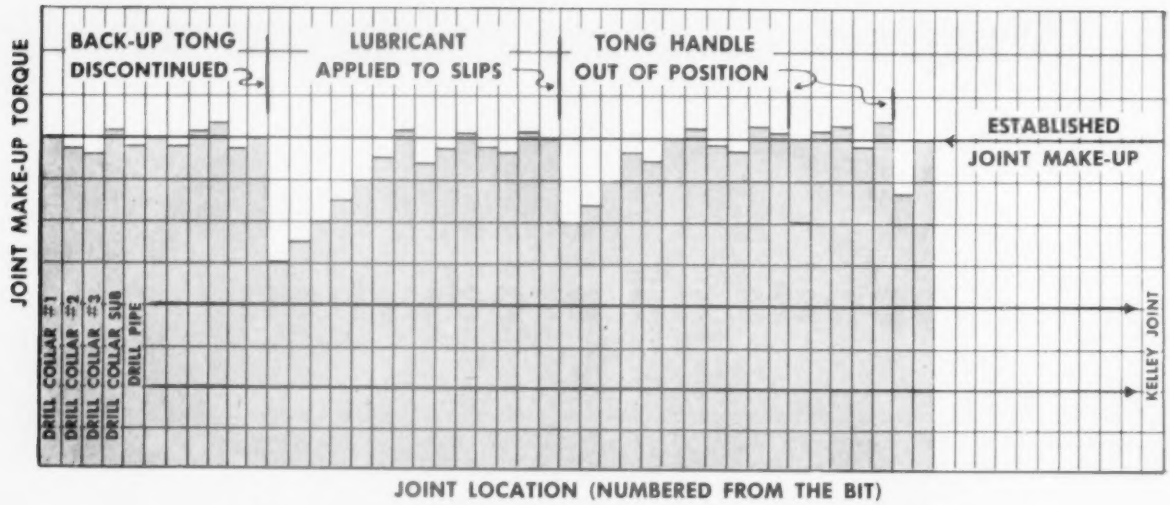


FIG. 1. diagram showing typical variation in joint tightening which can occur when making up a drilling string by conventional methods.

New Tool Reveals Unsuspected Causes of Loose Tool Joints, Drill Collars and Drill Pipes

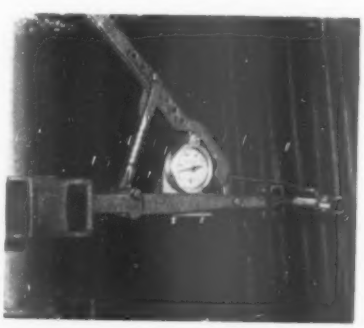
Fig. 1 Above illustrates graphically three conditions which can result in undertightened joints unsuspected by the driller. These joints then become likely points for a washout to originate. The tool which visually shows these conditions on the rig is the Martin-Decker Tong Torque Gauge, which many progressive operators are now using as insurance against these troubles.

The sharp drop-off in joint torque at the point where use of back up tongs is discontinued is apparent when a Torque Gauge is used and the back up tongs are removed at the point where it appears that the slips are holding. The drop-off is due to a combination of two things. The slips turn slightly in the bowl and do not give as solid a back up as the tongs, thus the momentum effect of the cathead clutch is lost by this cushioning. Also, in turning in the bowl, the slips allow the tong handle to turn past the operating position—which is normal to the jerk line. This has the effect of shortening the effective lever arm of the tong handle. Utilization of the torque gauge will show the driller at what joint the back up tong may be safely discontinued. In many cases this will prove to be farther down the hole than the joint where it appears that the slips are holding against rotation.

The second condition illustrated by the graph shows the effect of lubricating the slips. The result is a decrease in joint torque if lubricant is applied shortly after removal of the back up tongs. If lubricant is applied while the back up tongs are in use, the result is a longer interval before the tongs may be safely removed. The actual effect can vary considerably depending on the type and amount of lubricant used.

The last condition shown on the graph could occur at any point, but illustrates the effect of the tong handle being rotated out of position normal to the jerk line. The effect will not be shown by the torque gauge unless it is applied to the back up tong line. When used on the back up line, the length should be adjusted to give a right angle with the tong handle. (Advertisement)

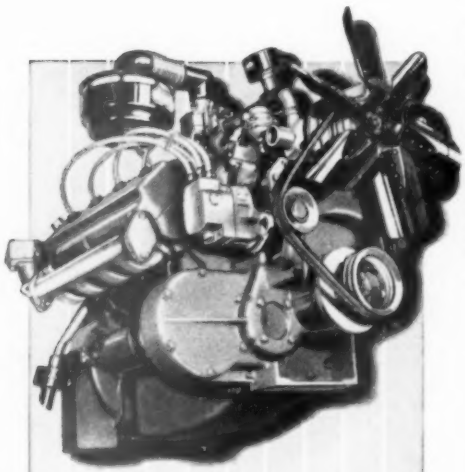
Martin-Decker tong torque gauge



Gauge installed on tongs

Photo courtesy Hale Fire Pump Company, Conshohocken, Pa.

Chrysler Power provides modern solution to age-old problem of irrigation



Early last summer, the owner of this 640-acre farm near Williamsburg, Virginia, decided to irrigate 120 acres. Taking his water from the nearby James River, he irrigated 70 acres of corn, 50 acres of soy beans. Water was pumped at the rate of 960 gallons per minute, fourteen hours a day, seven days a week. Each acre required approximately 36,000 gallons.

The results were astounding. Not only did this farmer save his crops during an especially dry summer, but his corn and soy bean yields actually *increased* 100% over the year before. In each case, 1952 was considered a normal year.

What this farmer did with his Hale Model CIRV Pump demonstrates again the effectiveness of Chrysler Power. Here the 331-cubic-inch displacement Model 20 V-8 Engine is used because the manufacturer wants great power with light weight, continuous, economical operation.

Manufacturers find Chrysler Engines ideal for almost any equipment requiring extra power without extra weight. Manufacturers also find they can order engines equipped *by Chrysler* to meet the needs of the equipment and their customers. For example, Chrysler Engines can be supplied with gasoline, natural or liquid propane gas burning carburetors, standard or gear-driven front ends, 12 or 24 volt electrical system.

Chrysler Industrial Engines are not expensive. Production line methods, adapted to specialized industrial engine building, provide a custom-built engine at mass-production prices. See a Chrysler Industrial Engine Dealer, or write: ***Dept. 1511, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

CHRYSLER
Industrial Engines

HORSEPOWER WITH A PEDIGREE

AT HOME ON THE RANGE—
because it's
Lubricated

Valves installed at isolated well heads out in the range country must operate efficiently and dependably. Often there's no one for miles to attend these valves if trouble should develop.

That's why it's best to install Nordstrom Lubricant-Sealed valves on isolated Christmas trees. The lubricant-protected seating surfaces maintain an intimate tapered fit year after year. A film of lubricant completely surrounds seat ports preventing leakage at any flowing pressure.

Even when operated in one position—either open or closed—for long periods of time, the valve can be turned easily and quickly. Why? Because the plug glides on a film of *lubricant*.

For Christmas tree installations way out in remote fields . . . for *all* Christmas trees . . . be sure to specify Nordstroms—the valves that are *at home on the range*.

A colorful, informative bulletin, "Trees of Steel" describing Nordstrom valves for Christmas trees has just been published. Write for your copy now! Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Licensee: Peacock Brothers Limited.*

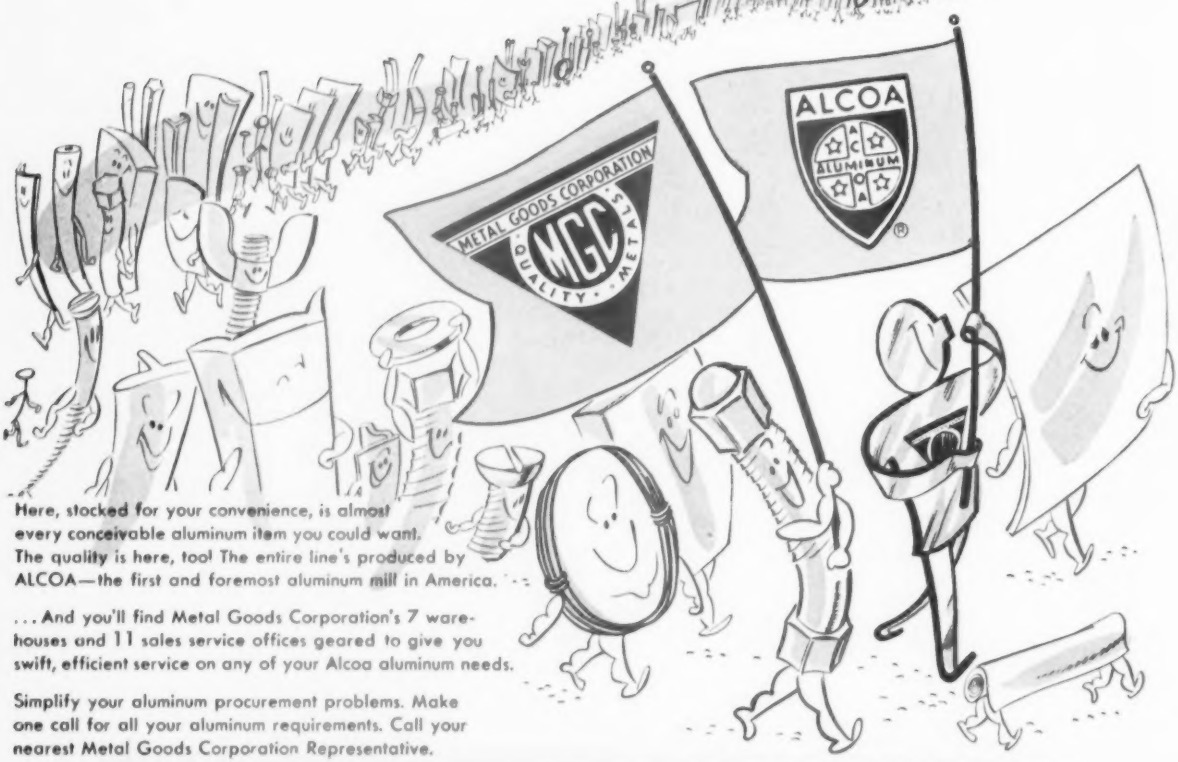
Wherever you are in the oil fields, there's a supply store with Nordstrom valves and Nordstrom service nearby.

ROCKWELL Built
Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

Another ROCKWELL Product

A Great Line of Aluminum to serve you ...2874 different items in stock



Here, stocked for your convenience, is almost every conceivable aluminum item you could want. The quality is here, too! The entire line's produced by ALCOA—the first and foremost aluminum mill in America.

...And you'll find Metal Goods Corporation's 7 warehouses and 11 sales service offices geared to give you swift, efficient service on any of your Alcoa aluminum needs.

Simplify your aluminum procurement problems. Make one call for all your aluminum requirements. Call your nearest Metal Goods Corporation Representative.

METAL GOODS CORPORATION

DISTRIBUTORS FOR ALUMINUM COMPANY OF AMERICA

OFFICES AND WAREHOUSES

St. Louis 15, Missouri
5239 Brown Avenue
Nelson L. Hower
Phone: GOodfellow 1234

Kansas City 16, Mo.
1300 Burlington
Frank D. Hogan
Phone: NOrclay 3516

Dallas 9, Texas
6211 Cedar Springs Rd.
Sam D. Hodgdon
Phone: ELmhurst 3271

Tulsa 3, Oklahoma
302 North Boston
Scott J. Harrison
Phone: 4-4101

Denver 2, Colorado
2425 Walnut Street
Neal Dehn
Phone: AComa 5891

Houston 3, Texas
711 Milby Street
Harris T. Gregg
Phone: CEntral 8881

New Orleans 12, La.
432 Julia Street
Carl T. Wedemeyer
Phone: CAnal 7373

SALES SERVICE OFFICES

Wichita, Kansas
2200 East Central
Ray Noller
Phone: AMherst 7-8921

Decatur, Illinois
1305 West Sunset
Arlie W. Tempel
Phone: 8-1314

Beaumont, Texas
238 Bowie Bldg.
Lee T. Dodson
Phone: 4-7536, 4-7537

San Antonio, Texas
2012 Alamo Natl. Bldg.
Charles I. MacKenzie
Phone: GArfield 3161

Memphis, Tennessee
713 Columbian Mutual Tower Bldg.
Robert W. Downs
Phone: 5-8721

Fort Worth, Texas
3821 Carolyn
John M. Turbitt
Phone: FOrtune 4369
FOrtune 5326

Corpus Christi, Texas
Room 301-02 Wilson Bldg.
Roy D. Bagaley
Phone: 4-0366

Jackson, Mississippi
781 Raymond Road
George E. Akerberg
Phone: 5-2711

Omaha, Nebraska
3515 No. 67th Avenue
C. M. Cooley
Phone: WAlnut 1112

Bettendorf, Iowa
P. O. Box 181
Harry L. Newton

Des Moines, Iowa
2600 Woodland
W. P. Crowley, Jr.
Phone: 4-9923

GENERAL OFFICES: ST. LOUIS 15, MISSOURI

How SUNRAY OIL boosts pipe line capacity 25%

Three years ago production skyrocketed at the Sunray Oil Corporation refineries in Duncan and Allen, Okla. Expansion throughout the system overloaded the 6-inch pipe line between the two cities. Bigger pipe was not available.

Sunray engineers hit on a cost-cutting solution—installed three electrically powered booster stations between regular pumping stations. They know that electric motors cost less to install . . . require little maintenance . . . are easily adapted to remote control circuits.

Then engineers selected an RCA 960-mc Microwave radio-relay system to effect complete remote control of the *"boosters"* from regular pumping stations. Microwave stations spaced miles apart proved cheaper to install and maintain than direct wire. And Microwave systems are virtually weatherproof.

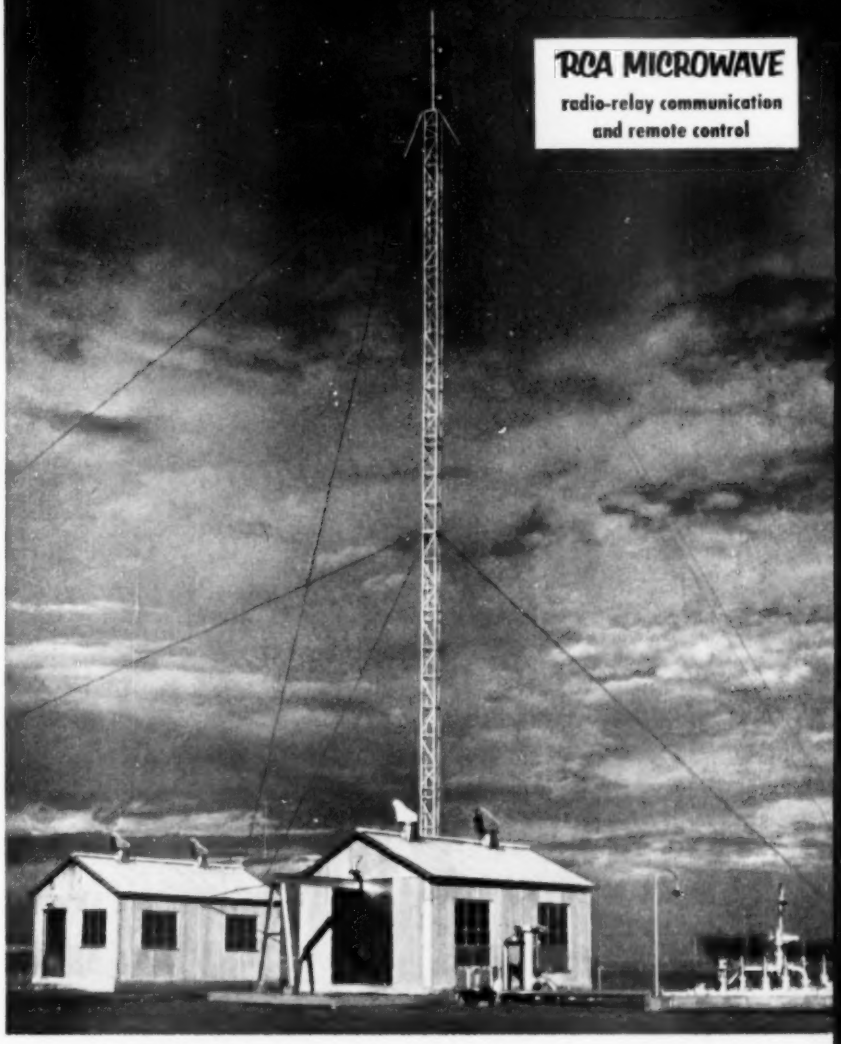
When the Sunray microwave-operated *"boosters"* were put in operation on January 31, 1952, *the pipe line's capacity immediately increased 25 per cent!*

RCA Microwave "beams" highly directional radio signals from station to station by "dish" antennas. Since 1946 RCA has installed many fully reliable Microwave systems, some over 1,000 miles long. *All have proved themselves in performance*—for utilities, government agencies, telegraph companies, turnpikes, as well as pipe lines.

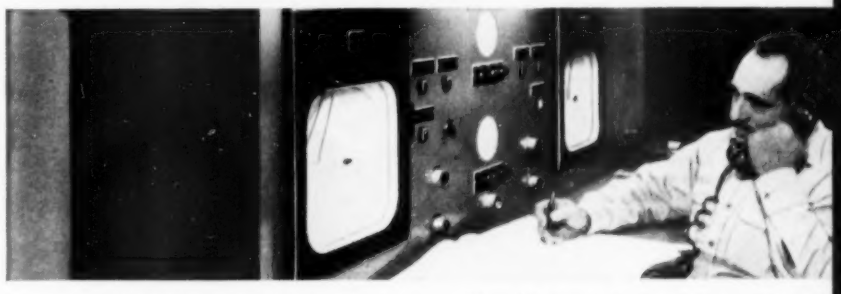
In addition to remote control and supervisory functions, RCA Microwave provides as many voice and teletype channels as you need—and does it with a minimum of frequency space. It employs readily available tubes and familiar circuits which are easy to service. It interconnects with your telephone lines and switchboards.

If you desire, RCA supervises survey, construction and installation—offers a complete single-source, single-responsibility service. And only RCA can provide the nationwide service facilities of the RCA Service Company.

For more information, mail the coupon ▶



Unattended booster station at Pernell, Okla. Radio-beam signals via RCA Microwave operate the booster by full remote control. Maintenance man inspects each station once every 24 hours.



Telemeter charts give continuous record of power and pressures at boosters. Operator remote-controls valves and pumps of booster stations. Signal lights indicate equipment failure and emergency generator operation. 2-way voice channel contacts maintenance personnel.

RCA **RADIO CORPORATION of AMERICA**
COMMUNICATIONS EQUIPMENT CAMDEN, N. J.

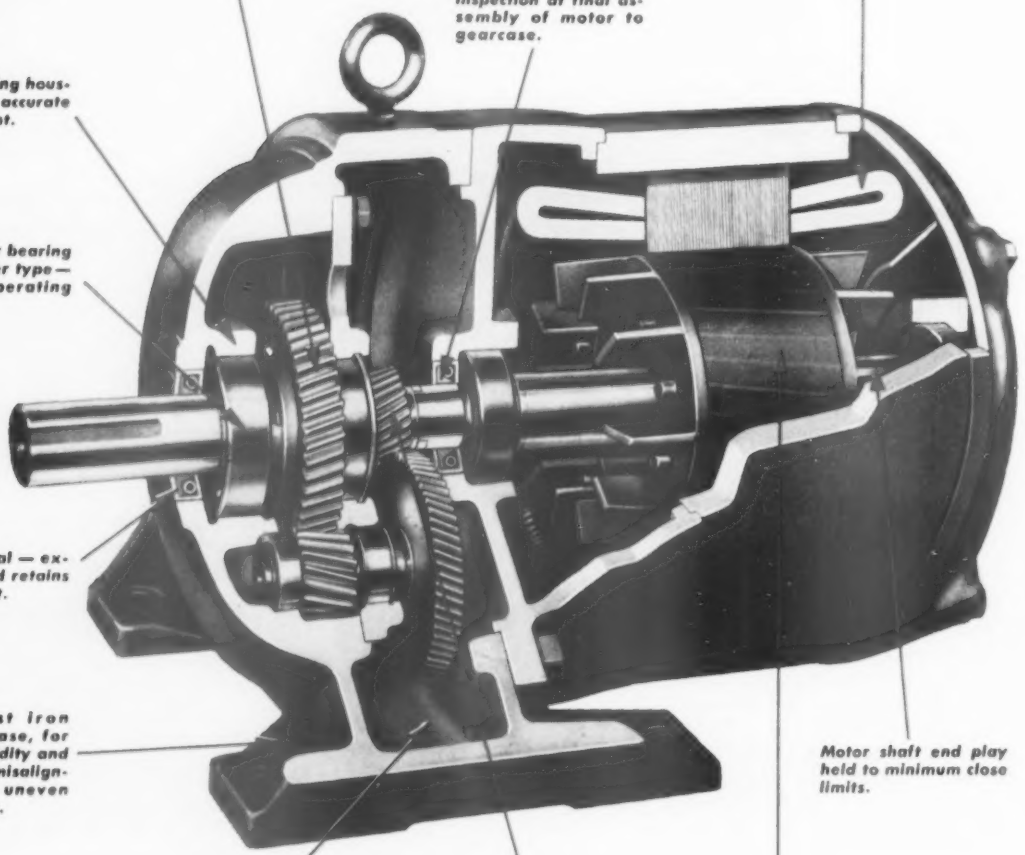
Dept. 89W, Building 15-1
Without obligation on my part, please send me your free booklet on:
☐ A Booster Station Microwave System ☐ Pushbutton Operation of Boosters

Name _____ Title _____ Company _____

Address _____ City _____ Zone _____ State _____

☐ Have an RCA representative get in touch with me.

NEW GEARMOTOR by



Precision processed, file-hard gears for long wear and resistance to peak overloads.

Selected positive oil seal between gears and high-speed bearing. Lengthens bearing life by sealing off abrasive matter. No blind assembly—visual inspection at final assembly of motor to gearcase.

Properly insulated and carefully impregnated windings for maximum protection and long life.

Integral bearing housings maintain accurate gear alignment.

Extra capacity bearing —ball or roller type— for severe operating conditions.

Positive oil seal — excludes dirt and retains clean lubricant.

Rugged cast iron pyramidal base, for maximum rigidity and strength. No misalignment due to uneven foot mounting.

Motor shaft end play held to minimum close limits.

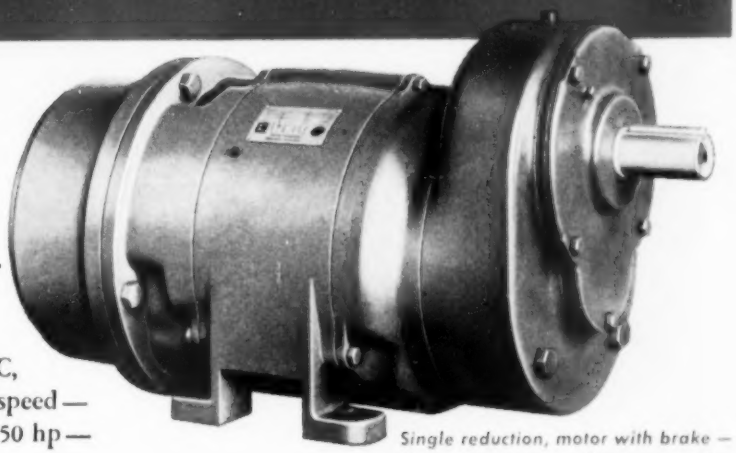
Large oil reservoir — efficient splash lubrication.

Locked motor shaft pinion provides positive contact for minimum vibration on reversing service.

Precision-balanced die-cast rotor.

W3-9

ELLIOTT CROCKER-WHEELER



Single reduction, motor with brake — A complete integral power unit —

Gives you the speed you want, where you want it —

In single reduction, 780 to 280 rpm . . . double reduction, 230 to 45 rpm . . . triple reduction, 37 to 7.5 rpm —

With any Crocker-Wheeler Motor — AC, squirrel-cage, wound rotor, DC, multi-speed — in the range of frame sizes from 1 to 150 hp —

In any closure type — open-protected, enclosed non-ventilated, splashproof, enclosed fan-cooled, explosion-proof —

For any mounting required — horizontal, ceiling, sidewall, inclined —

Available also with the C-W disc brake, as a complete integral power unit —

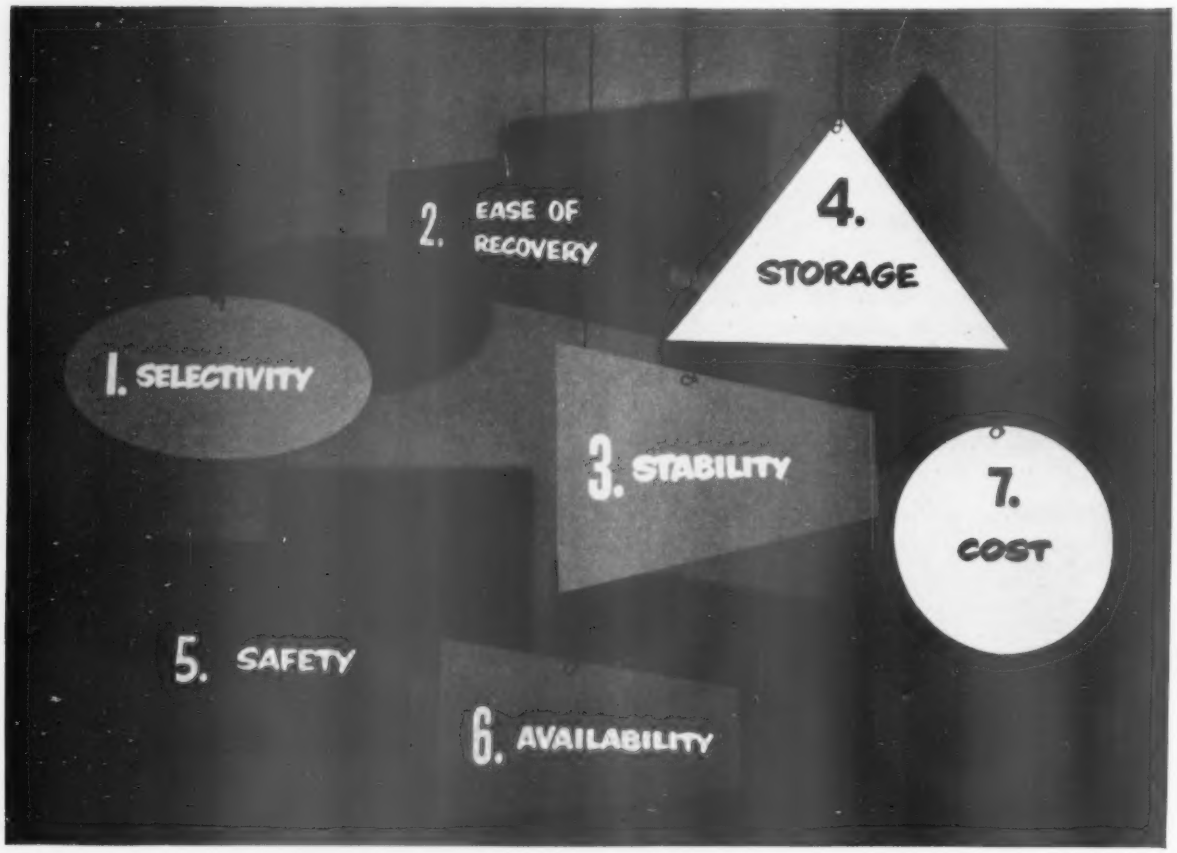
GET THE GEARMOTOR DATA BOOK
— ask your local Elliott District Office or write direct to Elliott Company, Crocker-Wheeler Division, Ampere, N. J.

C-W Form BA squirrel-cage motor with double-reduction gear —

Triple-reduction gear unit mounted on C-W totally-enclosed fan-cooled "Sealedpower" explosion-proof motor —

ELLIOTT Company
CROCKER-WHEELER DIVISION

QO FURFURAL, *The* SELECTIVE SOLVENT FOR THE PETROLEUM INDUSTRY



What Makes Furfural So Good?

1. SELECTIVITY: Furfural is highly selective; it is a polar molecule and gives a sharp separation. Its high specific gravity permits rapid phase separation.

2. EASE OF RECOVERY: Furfural is a stable compound and may be readily recovered from aqueous solutions by steam stripping; it may be recovered from non-aqueous solutions either by flash vaporization, straight distillation, steam stripping, or extraction with water.

3. STABILITY: Under the conditions encountered in refining furfural has a high degree of stability as shown by the low solvent losses in operating plants around the world.

4. STORAGE: It is not necessary to use special handling precautions for cold weather since furfural has a low freezing point of −34°F. which is well below temperatures normally encountered. Generally, furfural is stored and handled in steel tanks and lines.

5. SAFETY: Furfural has a safety record extending over 30 years of industrial use. It has a high flash point (150-160°F.) and a vapor pressure of 8 mm. Hg at 39.9°C.

6. AVAILABILITY: Large quantities of furfural are produced the year around at three plants from raw materials which are replaceable annually.

7. COST: Furfural is low in price, and with high recovery, over-all solvent costs are attractively low.

If you would like to know more about the properties of furfural, write for our Bulletin 203 "Physical Data on Furfural."

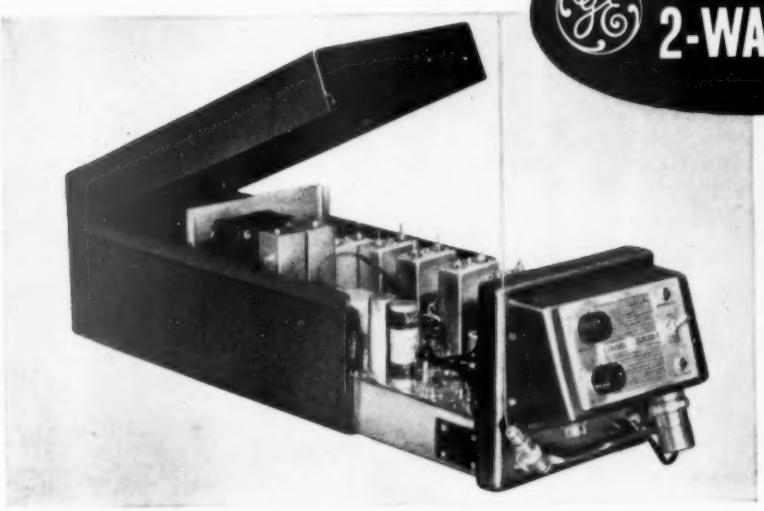
The Quaker Oats Company CHEMICALS DEPT.

339L The Merchandise Mart, Chicago 54, Illinois
Room 539L, 120 Wall St., New York 5, N. Y.
Room 439L, P. O. Box 4376, Portland 8, Oregon
In the United Kingdom: Imperial Chemical Industries Ltd., Billingham, England
In Europe: Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S. A., 3, Rue Pillet-Will, Paris IX, France
In Australia: Swift & Company, Pty., Ltd., Sydney • In Japan: F. Kanematsu & Company Ltd., Tokyo

General Electric Announces a

NEW ADVANCED 2-WAY RADIO DESIGN

Low Power Industrial
2-WAY RADIO



Remove just 4 screws . . . control head is dismounted for flexibility of application!

- **Lowest current drain in standard use today!**
- **6/12 . . . 28 to 40 . . . or 117 volt operation!**
- **Mobile units are interchangeable with station equipment!**
- **Adds multiple new applications!**
- **Extremely compact!**
- **Sensitive . . . selective . . . has clear, crisp audio!**
- **General Electric engineered for the materials handling function!**
- **Weather resistant!**

THE basic intent behind General Electric development of this new mobile unit is to enhance the value of radio in your industry's operations. In it you see features that are head and shoulders above all other low power industrial radio equipment. With it your work will be performed faster and better *regardless of your business requirements!* Whether you want more miles of pipeline serviced . . . more crops harvested at the right market time . . . more emergencies avoided or solved . . . or more customers served . . . you will get more industrial productivity at lower cost than ever before. In these and many other fields G. E. has opened new, broader avenues of radio application! Investigate its advantages to you today!

YOUR CAS* MAN...

has complete information on the new LPI equipment. Take advantage of the service he offers at a local G-E office today or send us this coupon!

*Communications Advisory Service

75 YEARS OF ELECTRICAL PROGRESS

General Electric Company, Section 8113-2
Electronics Park, Syracuse, New York

Please send me the new G-E LPI Radio literature describing features and specifications.

NAME.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

GENERAL ELECTRIC

From the Yukon to the Rio Grande

THE JOHNSTON-SUTLIFF HYDRAULIC JAR IS USED TO MEET ANY CONDITION

FOR ALL TYPES OF JOBS! Hits any desired blow . . . at any time. Changes to meet any condition without coming out of the hole.

Simplicity of operation, requires no torque. It is an exceptionally rugged self contained Hydraulic tool with only two moving parts. And is available in all drill pipe sizes.

During three years of use in oil fields everywhere it has become the standard on drill stem testing jobs.

FORMATION AND CASING TESTING JOHNSTON

JOHNSTON TESTERS INC.

HOUSTON • LOS ANGELES

Export Division: 3035 Andrita St., Los Angeles 65, California

SERVICE BRANCHES IN ALL ACTIVE AREAS

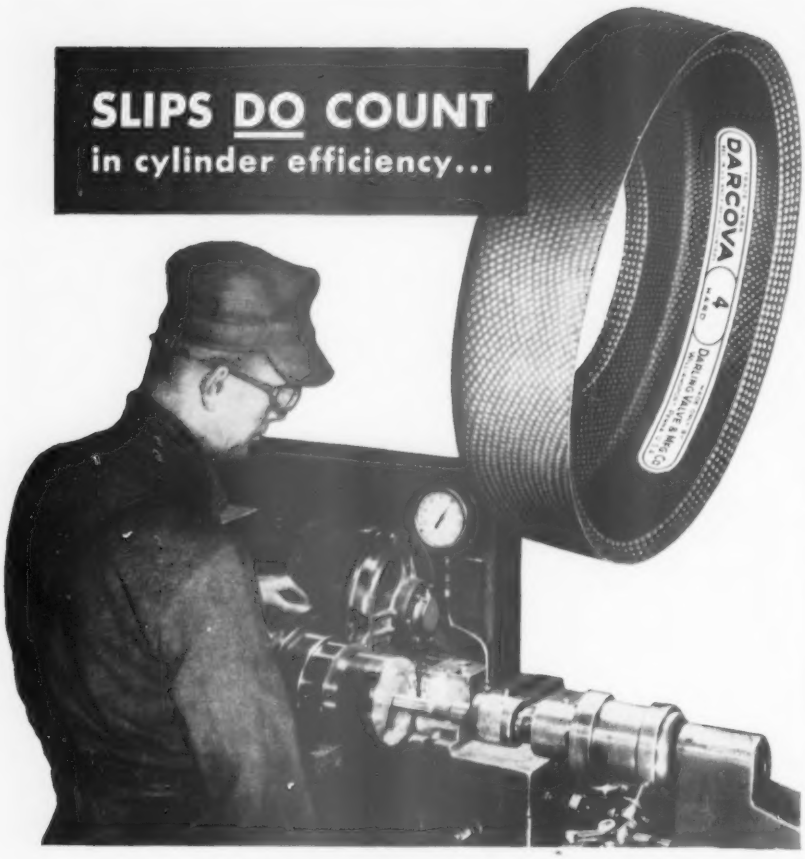
Be sure with Pure

Producers • Refiners • Marketers

of petroleum products

THE PURE OIL COMPANY

Marketing Offices in Principal Cities of the Eastern, Central and Southern States
General Offices, Chicago, Illinois



Now, cost-conscious engineers are standardizing on **DARCOVA PUMCUPS!**

Reason—On all types of air and hydraulic controls and mechanisms maximum volumetric efficiency is assured with Darcova Pumcups. Moreover, Pumcups outlast ordinary packing at least 3 to 1!

CHECK THESE OTHER ADVANTAGES TOO!

- Reduced operating speeds
- Fewer shutdowns
- Smoother operation
- Lower power costs
- Longer cylinder life
- Closer control

If your slippage is showing, write for Bulletin No. 4502 on Darcova Pumcups for air and hydraulic mechanisms . . . or Bulletin No. 4401 on Pumcups for reciprocating pumps.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

They Say—

U. S. Has Enough Oil for War

"The petroleum industry is capable of increasing its deliveries of petroleum products by 1,000,000 bbl. per day in the event of all-out mobilization.

"America and her allies have a decided advantage over Russia and her satellites in the matter of petroleum. Whie Russia keeps troops stationed in the oil fields of Roumania to help meet the 1,250,000-bbl. per day Communist requirements, the petroleum industry of the United States has built up the 1,-000,000-bbl. per day excess producing capacity.

"Our generals and admirals have never been forced to curtail plans because of lack of oil. Almost two-thirds of the tonnage shipped offshore during World War II was petroleum, and there was no shortage. The petroleum industry, if left unhampered by bureaucratic regulation and unoppressed by greater taxation, will continue to furnish the military with all the oil it can use."

Milliard K. Neptune, president, Platte Pipe Line Co., addressing the Southwestern Missouri Oil Mens' Club, Joplin, Mo.

Oil Industry Not Restricted

"Unlike the electric-power industry, our industry has not been subject to competition from government-owned installations. Unlike the railroads, we have not been hamstrung by a multitude of restrictive regulations by the Interstate Commerce Commission that still incentive and stifle initiative. Unlike agriculture, our industry has not had to live under the threat of wide price fluctuations, caused by mass purchases and sales of surplus commodities by the federal Government. What I am saying is that, in my sincere opinion, petroleum products would not be so plentiful and cheap as they are today except for the fact that the industry has not been overregulated.

It is the superb living standard of over 150,000,000 people under our free enterprise system that has created and will sustain an enormous market for petroleum products. We could not have found and sustained an abundance of crude petroleum had we not been free to enterprise for it.

"Why is the development of oil-producing property so slow in certain countries of South America and in Europe? The fact is that most of these

countries operate under a system of law different than the one we acquired from old England. Under their system it's the government, not the surface landowner, that controls underground mineral deposits, including oil."

Bruce K. Brown, president of Pan-Am Southern Corp., speaking at an Oil Progress Week gathering in Evansville, Ind.

Greater Emphasis on Research

"The oil industry is of a highly technological nature and necessarily places great emphasis on research. Oil companies spend a total of about $125 million a year in a never-ending search for new products, new processes, and new methods.

"In addition to the research effort aimed at finding new and better ways of doing things, new products, and new uses for oil products, oil companies invest heavily in proved techniques for exploration, production, manufacturing, transportation, and distribution. In the past 20 years, my own company has invented over $2 billion in capital outlays alone on these activities just in the Western Hemisphere, to buy the more efficient, cost-saving tools we must have to survive in this competitive industry."

Albert L. Nickerson, vice president of Socony-Vacuum Oil Co., Inc., addressing the College English Association Institute, Corning, N. Y.

U. S. Needs More Imports

"Unless additional oil imports are available to us in the years to come, we will find it difficult, if not impossible, to meet expected demand for oil and maintain the present ratio of proved reserves to production in the United States. To maintain this ratio over the next 20 years without additional imports, the oil industry would have to find a billion barrels more oil a year than has been discovered annually in this country since World War II.

"To forfeit our rights to that foreign oil in an effort to solve a temporary oversupply problem at home would be to jettison fuel at the start of a transoceanic flight against headwinds of unknown strength.

"To the argument that we must be prepared to depend on oil within our own borders in wartime, the obvious answer is that in neither of the last two wars did we fight alone or could we have. Just as nations succeeded city states, and principalities succeeded tribes, so the world now seems to be coalescing into supernational units in which we must join or perish. It would be suicidal not to develop in peacetime the economic cooperation we have twice found indispensable in war."

B. Brewster Jennings, president of Socony-Vacuum Oil Co., Ind., addressing the fifth annual Oil Progress Week luncheon, New York.

Imports Cut Domestic Revenue

"The only crime the independent producers have committed is to have gone out and spent their money and found an abundant supply of domestic oil for peacetime pursuits and for defense.

"Now they are flooded with a torrent of foreign oil that is supplanting our own oil.

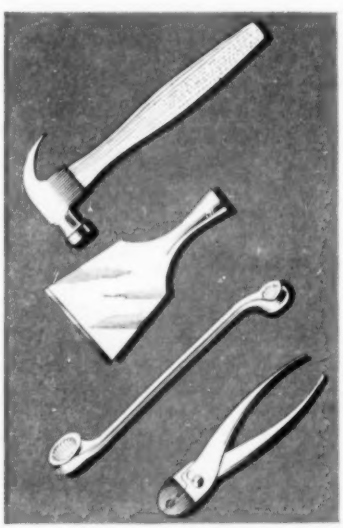
"This is not fair to the producers. It adversely affects our state revenue. It robs Texas of her oil market.

"We have had to cut our Texas allowable three times in 3 consecutive months a total of 345,000 bbl. per day. At $2.85 a bbl., the present average price, that is $983,400 per day loss in current income revenue to the producers of oil in Texas.

"Of course, the State of Texas is denied for the time the tax revenue of

Is YOUR plant worth half a dollar?

A few of more than 200 high performance Berylco Safety Tools. Send today for complete, illustrated free catalog.



When you consider that one spark can put you out of business—permanently—pennies are an awfully small price to pay for the assurance a Berylco Safety Tool gives you. In many cases, the price differential between a Berylco tool and a steel tool of similar quality is remarkably low. For example, Berylco claw or ball peen hammers cost only 15% more than quality steel tools.

Berylco Safety Tools are made of high-performance beryllium copper. They are nonsparking in the presence of flammable or explosive liquids, gases and dusts. They are noncorrosive and nonmagnetic. In addition, they have high service strength and compact design—made possible by the great hardness and tensile strength of the alloy.

Berylco Safety Tools are sold by leading wholesalers the country over. For the name of the one nearest you, write

BERYLCO

THE BERYLLIUM CORPORATION
DEPT. 3K
Reading 15, Pa.

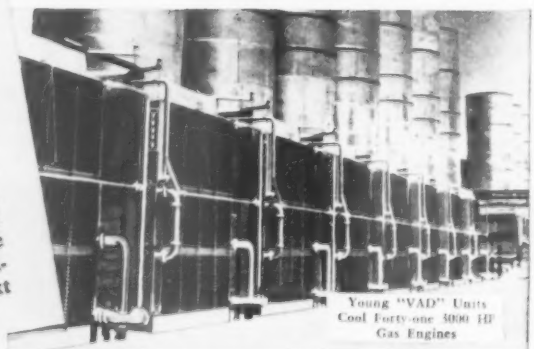
New York • Springfield, Mass. • Rochester, N.Y. • Philadelphia • Cleveland
Dayton • Detroit • Chicago • Minneapolis • Seattle • San Francisco • Los Angeles

Representatives in principal world-trade centers

YOUNG

SELECTED FOR COOLING ONE OF THE WORLD'S LARGEST INTERNAL COMBUSTION PLANTS

Reynolds Metals Company's new aluminum reduction plant at San Patricio, Texas, has been proclaimed one of the world's largest and finest internal combustion installations. Here 83 natural gas driven Diesel engines generate 278,400 HP, and develop a total of 543,000,000 BTU per hr., which must be dissipated. Young's heat transfer organization . . . with completely integrated facilities for the design, development, manufacture, testing, rating, and installation servicing of specialized heat transfer equipment was commissioned to handle the cooling job. 83 rugged, compact, thermostatically controlled units, for cooling the Engine Jacket Water and Lube Oil, plus 84 Supercharger Air Intercoolers for increasing both horsepower and efficiency of engines, were delivered by Young. Certified Ratings and more than a quarter century of proved performance in the field assure complete satisfaction. Take advantage of this experience . . . specify that your next job is Young-engineered.



Young "VAD" Units Cool Forty-one 3000 HP Gas Engines

Young "HC" Units Cool 42 Cooper-Bessemer 4700 HP Gas Engines

YOUNG RADIATOR COMPANY

Dept. 203-LI, Racine, Wisconsin

Plants at Racine, Wisconsin and Mattoon, Illinois

YOUNG

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Applications

Heating, Cooling, Air Conditioning Products for Home and Industry

Leaders in Heat Transfer Engineering for more than 25 years

about 11 cents a barrel on this oil we can not sell to anybody."

Ernest O. Thompson, chairman of the Texas Railroad Commission, delivering the opening address at the annual Independent Petroleum Association of America convention, Fort Worth.

More Than Specialists Needed

"Undeniably, a part of modern education must be vocational in emphasis. As we face the increasing complexities of the modern world, we need more and more highly trained specialists. But we need more than that.

"We badly need today men with the broad outlook, men with a sure grasp of their intellectual heritage, mentally and morally disciplined and trained to evaluate data and arrive at sound decisions in all aspects of life. Such men have established standards to guide them, not only intellectual but moral as well.

"However we arrive at it, it is my belief that moralty is a basic part of education."

Dr. Robert E. Wilson, chairman of the board of Standard Oil Co. (Ind.), speaking at the inauguration of Dr. Paul H. Giddens as president of Hamline University, St. Paul, Minn.

CALENDAR OF EVENT

NOVEMBER

- **3- 4** Society of Automotive Engineers, national diesel-engine meeting, Conrad Hilton Hotel, Chicago.
- **5- 6** Society of Automotive Engineers, national fuels and lubricants meeting Conrad Hilton Hotel, Chicago.
- **5-6** American Association of Petroleum Geologists, Pacific section, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists annual joint meeting, Hotel Biltmore, Los Angeles.
- **6- 7** Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
- **9-11** Geological Society of America, annual meeting, Royal York Hotel, Toronto, Ont.
- **9-12** American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
- **12-13** Society of Exploration Geophysicists, midwestern meeting, Adolphus Hotel, Dallas.
- **19-20** National Association of Corrosion Engineers, western region, fall conference, Biltmore Hotel, Los Angeles.
- **19-20** Annual Instrument Short Course, Los Angeles Harbor Junior College, applied technology division, Wilmington, Calif.
- **20** Natural Gasoline Association of America, regional meeting, Herring Hotel, Amarillo, Tex.
- **Nov. 29-Dec. 2** American Society of Mechanical Engineers, Statler Hotel, New York City.

DECEMBER

- **1- 4** Corrosion conference, University of Oklahoma, Norman.
- **13-16** American Institute of Chemical Engineers, annual meeting, Hotel Jefferson, St. Louis.

JANUARY

- **11-15** Society of Automotive Engineers, annual meeting and engineering display, Sheraton-Cadillac and Statler Hotels.
- **12-14** National Constructors Association, annual meeting, Hotel Commodore, New York City.

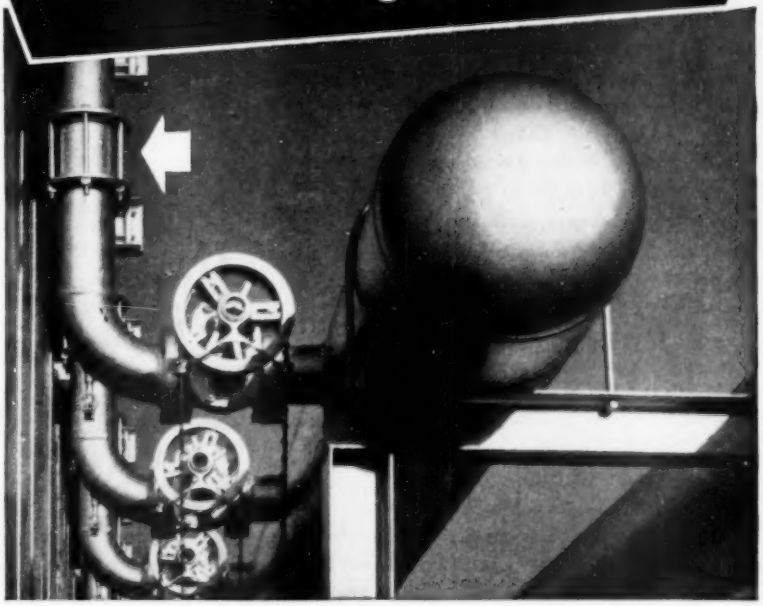
FEBRUARY

- **26** Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

- **1- 5** American Society for Testing Materials, spring meeting, Shoreham Hotel, Washington, D. C.
- **3- 5** American Petroleum Institute, Division of Production, Southwestern district, Rice Hotel, Houston.
- **4- 5** American Gas Association, transmission and storage conference, Jung Hotel, New Orleans.
- **8-10** American Institute of Chemical Engineers, Statler Hotel, Washington.
- **17-19** American Petroleum Institute, Division of Production, Mid-Continent district, Skirvin Hotel, Oklahoma City.

MIGHTY HANDY...to have around a cooling tower



Around a cooling tower or anywhere else you've got pipe to join, the handiest, surest way to get "Flexible-Tight" joints is with Dresser Couplings or Long Sleeves.

Dressers provide the "give and take" necessary to absorb vibration, settlement and other stresses. Specially compounded rubber gaskets permit up to 4° deflection at joints—yet with Dressers, these joints stay permanently tight.

The only tool you need is a wrench—no pipe threading is necessary. Any workman can install Dressers with ease.

Get Dressers from your nearest supply store.

DRESSER

"FLEXIBLE-TIGHT"

COUPLINGS

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Bayshore Highway, South San Francisco, California.

PARKERSBURG STEEL BUILDINGS

Economical, Easily Erected, Available for any need, 100% Salvable, Outstandingly Attractive

• Multiple-Type Factory Building made up of 8 Parkersburg Standard Steel Buildings.

Costing much less than conventional types of construction and requiring a minimum of maintenance, Parkersburg Steel Buildings enable you to save many thousands of dollars on your building needs.

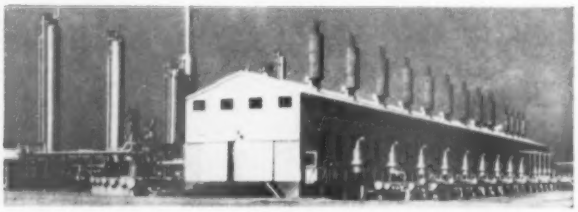
Parkersburg Steel Buildings are available in a wide variety of types and sizes to meet every business and industrial building need. Standard, self-supporting, non-structural type buildings are available in widths from 6′ 8″ to 28′; heights from 7′ to 16′ in any length desired. Standard structural types are available in widths from 32′ to 50′ 8″. Multiple buildings to cover extra large areas can be formed by using multiple units of any standard Parkersburg Steel Building.

The distinctive design of Parkersburg Steel Buildings, plus a choice of several window and door styles, gives them greater eye appeal and attractiveness than any other type of prefabricated building.

Get the whole story on Parkersburg Prefabricated Steel Buildings. Write today for our complete catalog No. SB-7-52.

• Multi-Purpose Portable Utility Building. This building, constructed of 22 gauge galvanized steel, is 10′ 8″ x 8′ x 7′ high. It is reinforced for greater strength and ruggedness; mounted on sturdy welded steel skid base for easier moving and loading. The floor is all welded heavy-duty steel. It has two 4-light windows and a choice of 6 types of doors.

Eliminate the expense of building and tearing down temporary tool sheds and offices on construction jobs by investing in a Parkersburg Multi-Purpose Portable Utility Building.



• Natural Gasoline Plant completely housed in a Parkersburg Steel Building.

• Parkersburg Steel Buildings make attractive office structures. The neat, trim partitions and ceiling assure an attractive interior.

No. 5318

PARKERSBURG
RIG & REEL COMPANY • Parkersburg, West Virginia

THE OIL AND GAS

JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

EDITORIAL STAFF

Kenneth B. Barnes, **Editor**; Henry D. Ralph, **Chief Editorial Writer**; Ted A. Armstrong, **News Editor**; George H. Weber, **Refining Editor**, 500 Fifth Avenue, New York; Dahl M. Duff, **International Editor**, 500 Fifth Avenue, New York; Gerald L. Farrar, **Engineering Editor**; Paul Reed, **Pipe-Line Editor**; W. L. Nelson, **Technical Editor**; Philip C. Ingalls, **Exploration Editor**; C. O. Willson, **Consulting Editor**; John C. Reidel, **Petrochemical Editor**; R. B. Tuttle, **Equipment Editor**.

Associate Editors: Lynn M. Nichols, Neil Williams, and John C. Casper.

District Editors: TULSA: Joseph A. Kornfeld, Edwin McGhee, Robert J. Enright, Carl Hoot, John C. McCaslin, Paul E. Swain, George Van Zant, and Charles L. Burch. HOUSTON, Sterling Building: F. Lawrence Resen and William P. Sterne. LOS ANGELES, 650 South Grand Avenue: D. H. Stormont. WASHINGTON, D. C., 621 Albee Building: Bertram F. Linz.

Editorial Assistant: Martha Allbright.

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

Advertising Offices: TULSA, John D. Reilly, Mid-Continent Manager and George O. Ruppert, Representative, 211 South Cheyenne, Phone 3-6291; NEW YORK: Charles A. Wardley, Eastern Manager, and Robert N. Caird, Jr., Representative, 500 Fifth Avenue, Phone LOngacre, 4-1750; CHICAGO: E. S. Klappenbach, Midwestern Manager, and David T. Kenney, Representative, 105 West Madison Street, Phone Central 6-2537; PITTSBURGH: Alfred M. Jones, Manager, 429 Fourth Avenue, Phone Atlantic, 1-4835; HOUSTON: John M. Spears, Gulf Coast Manager, Sterling Bldg., Phone CHarter 4626; LOS ANGELES: Donald O. Hanson, Manager, 650 South Grand Avenue, Phone Vandike 0722; ENGLAND: Harry Becker, European Representative, 111 Thorley Lane, Timperley, Cheshire, Phone Ringway 4702.

Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1953 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY Speaking

One Born Every Minute

WE knew oil men are gamblers and also that they have a weakness for listening to any scheme which promises to return a fast buck, but we didn't realize they were such gullible suckers as to fall for the old chain-letter racket.

Yet recently we intercepted (we won't disclose how) a letter containing the names of five responsible and respectable oil men with instructions to send $2 to the first name, add the sender's name to the bottom, and mail five copies of the letter to five new names. In due time, it was promised, the sender would receive a total of $2 to the fifth power, or $6,250.

The letter was headed: "A chain known confidentially only among a serious and respectable group of executives such as yourself. It is your responsibility to keep it that way." Since our name wasn't on the list, and since we're not an executive and there is some doubt as to whether we are serious or even respectable, we feel no moral obligation to keep mum on the subject.

However, we won't turn the names over to the Post Office Department, whose inspectors are kept busy suppressing such mail-fraud schemes as this something-for-nothing racket which skinned so many dupes during the chain-letter madness a few years ago. We're going to smuggle the names into Mexico and use them for the Spanish treasure racket, which pays off even better than chain letters.

Food for Thought

WE get into the strangest situations in this editing business. For instance, just the other day we were invited to a luncheon demonstrating a new line of diet foods for people who want to eat their cake and have "it," too. Why we were invited was a mystery to us, but we accepted in line of duty and found ourselves wedged self-consciously between a woman's-page editor and a domestic-science teacher daintily sampling sugarless sweets, oilless dressings, and decalorized dessert.

When we had finished, the hostess-demonstrator smiled sweetly and asked if we had had enough to eat. Nobody replied in the negative, audibly at least, so she proceeded to tell us that we had eaten only half the number of calories that would have been in the same menu prepared from ordinary ingredients, that eating calories is dangerous because it makes people overweight and causes all sorts of medical complications including premature demise, and that her company is dedicated to rescuing America from race suicide by taking several million pounds off of the collective population.

Being a conscientious oil writer, always trying to make copy out of every situation, we couldn't help but think of the Oil Progress Week literature in which the oil industry bragged how petroleum has increased the nation's food supply and reduced the amount of physical exertion required of all of us, and the horrid thought struck us that oil is responsible for this national curse of obesity. If it weren't for oil we would all be working harder and eating less, and everybody would be a lot healthier and longer lived.

But as we mused on this over a bowl of chili and a malted milk on the way back to the office our spirits revived and we were able to see the silver lining in the cloud. Oil is responsible for this lady's job and for this whole new foodless-foods business. So we can credit another new industry to oil. Petroleum promotes progress.

No 3-D

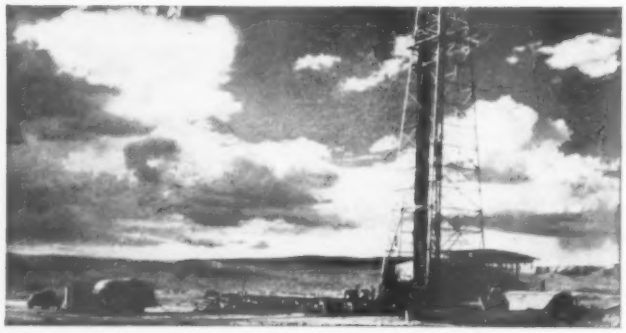
THERE won't be any three-dimensional advertisements in the Big Yellow Book. One advertiser submitted one, but the Post Office ruled that the individual polarized glasses stapled to the page constituted merchandise and the whole magazine would have to go as parcel post instead of at second-class postage rates. Too bad. You'll have to be content with plain, old-fashioned reading matter here, and go to the movies for 3-D. We can't compete with Hollywood.

—Henry D. Ralph.

GOOD REASONS WHY LANE-WELLS DOES THE JOB BETTER!

In every active oil area, Lane-Wells crews who really know local conditions have done hundreds or thousands of successful perforating jobs.

The Lane-Wells men who serve you are thoroughly familiar with your field and its particular demands. You get the benefit of their experience — plus on-the-spot service — when you call for perforating from the nearest of Lane-Wells 72 branches.



CALL

LANE WELLS COMPANY

and get the job done right — the first time

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Cutbacks were necessary but these are unfair

THE cutbacks in crude production which have been ordered by several states recently are discriminatory against certain producers, but they are necessary for the oil industry as a whole.

They need not have been so unfair, and would not have been if several states had made lesser cutbacks earlier, before stocks got so high. They had the warning and the means.

What is happening in oil today is an "inventory readjustment" such as many other industries have gone through during the past year and others still have to face. Oil is no exception to the general rule that production periodically gets ahead of consumption, bringing inventories to an unwieldy point. Then there is grief all around until inventories are worked down.

If inventory accumulation continues unchecked too long, the industry suffers a slump. If all industries slump at the same time, there is a general depression. Keeping supply in approximate balance with consumption is a vital concern of both industry and government.

THE oil industry doesn't realize how well situated it is, in comparison with other industries, in this problem of watching inventories and adjusting supply to demand. Our forecasts of demand, and the completeness and currency of our statistics on production and stocks are the envy of all other industries.

In addition to its superior information, the oil industry is in far better position to influence output than any other industry with as many individual producers. Through monthly adjustments in allowables, the conservation agencies of a half-score of states are in a position to accomplish this rather well in normal times—provided they (1) watch the statistics and (2) enough of them act soon enough and firmly enough.

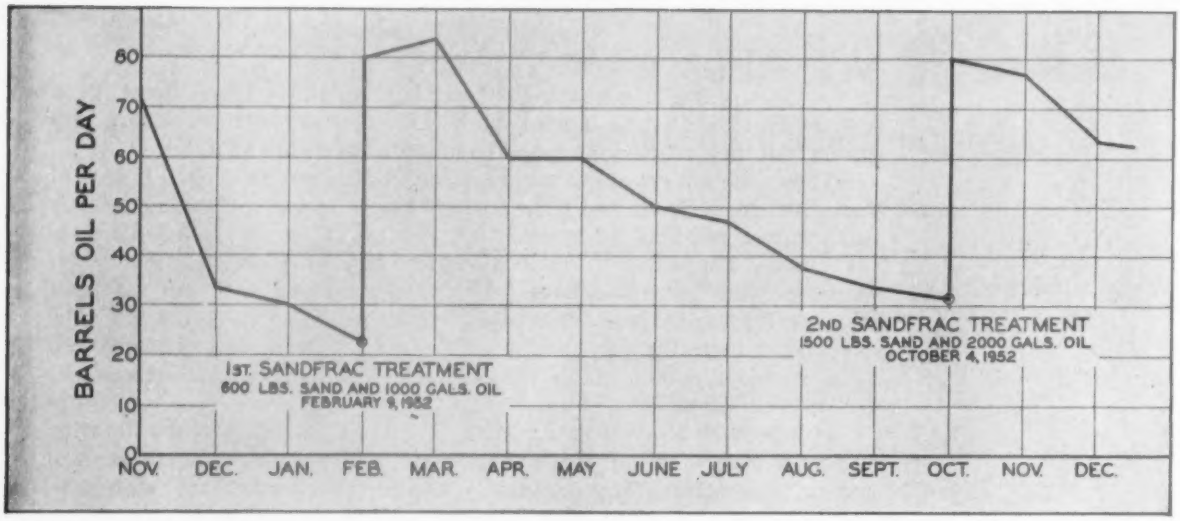
All through the summer as stocks built up to new highs, many states failed to make significant cuts. They blamed imports, or consoled themselves with the thought that their own local markets were not yet badly glutted, thus ignoring the fact that total supply controls the market as a whole. Oklahoma and Louisiana have been cited as examples.

IMPORTS may be the major villain in the present over-accumulation of inventory. Certainly importers share with domestic producers a responsibility in maintaining a balanced supply. But the big producing states could complain about imports with more grace if all had used their proration powers earlier and with more effect.

If they had done so, stocks would not be so high today and the recent cutbacks would not have been so sudden, so drastic, and so concentrated on certain groups of producers such as in Texas and Kansas.

PUT NEW LIFE IN OLD WELLS

Reconditioning by Dowell increased production 60 barrels of oil per day . . . boosted profits



No matter how you plan to work over that old well, it can be helpful to include a Dowell Service in the program. Good results have been obtained on thousands of wells that have been deepened, plugged back or reconditioned at the same depth. Dowell Services are applicable to nearly all types of formations under many different well conditions.

Here is a work-over case history:
This well was completed with an initial production of 72 barrels of oil per day natural. After three months, production had fallen to 23 barrels. A 1000-gallon Dowell Sandfrac treatment boosted production to 84 BOPD, flattening the decline curve as shown in the above graph. Payout time was less than five days.

During the next eight months production again declined, this time to 32 BOPD. A second Sandfrac treatment of 2000 gallons increased production to 80 barrels. Payout time was less than six days. Both treatments resulted in greater production than when the well was first completed.

Call Dowell today to discuss work-over problems on your old wells.

There are over 100 Dowell Offices, staffed with engineers trained in expert work-over methods.

YOU CAN COUNT ON DOWELL SERVICE FOR EFFECTIVE WORK-OVER AIDS

ETCHING ACID • SANDFRAC • SELECTIVE ACIDIZING • SPINNER SURVEYS • CALIPER SURVEYS • GLASS GUN PERFORATING • STRATAFRAC • CHANNELING ACID • TEMPORARY PLUGGING • PERMEABILITY SURVEYS • WATER LOCATING • TEMPERATURE SURVEYS

DOWELL SERVICE

Acidizing • Fracturing • Electric Pilot • Perfojet
Paraffin Solvents • Bulk Inhibited Acid • Jelflake®
Corban® • Chemical Cleaning for Heat Exchange Equipment

DOWELL INCORPORATED • TULSA 1, OKLAHOMA
A Subsidiary of The Dow Chemical Company

"First in Oilfield Acidizing . . . Since 1932"

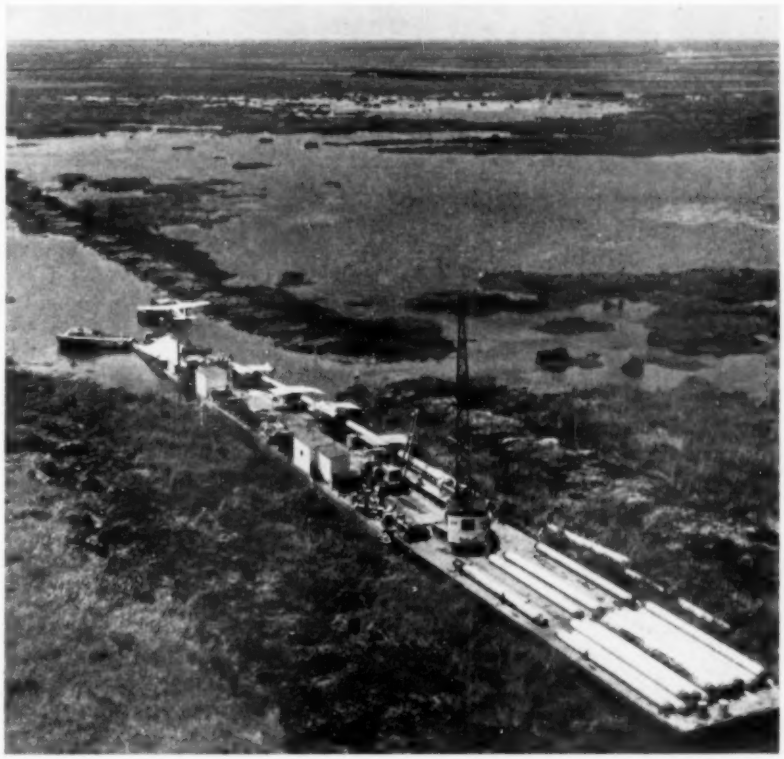
Look to **DOWELL**

FOR OIL INDUSTRY CHEMICAL SERVICE

THIS WEEK... ...IN THE NEWS

PIPE LINES—Lakehead Pipe Line Co. completing the final welding on its 635-mile, 30-in. line from Superior, Wis., to Sarnia, Ont. . . . The line is expected to be in full operation within 4 weeks. . . . ¶Williston Basin Pipe Line, Inc., negotiating with contractors for a 250-mile products line from Billings to Glendive, Mont., as Standard Oil Co. (Ind.) begins deliveries through its products line from Mandan, N. D., to Moorhead, Minn. . . . ¶Southern Natural Gas Co. nears the end of the toughest part of its $76,000,000 expansion program. . . . Only 17-mile segment remains to be laid of 450 miles of pipe through Louisiana swamp lands and under the Gulf of Mexico. . . .

PRODUCTION—Crude-production allowables fluctuate as both Oklahoma and Kansas cut the allocations for November and Louisiana restores half of the cut ordered last month. . . . ¶Tennessee Production Co. buys more than 2,000 producing wells, once the property of the recently liquidated Reno Oil Co. . . . Involved are 878 wells in Texas and Oklahoma and 1,100 in New Mexico, West Virginia, Ohio, Kentucky, and Pennsylvania. . . . ¶Standard Oil Development Co.'s "permanent completion" method using wire-line equipment instead of a more expensive rig is being made available to the industry through licensing. The method saves 1 or 2 days of rig time in completing wells and saves about 60 per cent in the cost of workover operations. . . .



CONSTRUCTION WORKHORSES on Southern Natural Gas Co.'s new 450-mile supply system in swampy southern Louisiana, now nearly complete, were four barges completely equipped to string and lay the 20 and 12-in. pipe. This project, one of the toughest pipe-line construction jobs ever tackled, required an outlay of roughly 43 per cent of the $76,000,000 dedicated for the company's huge 3-year, system-wide expansion program. How the job was handled is told in a story beginning on page 58.

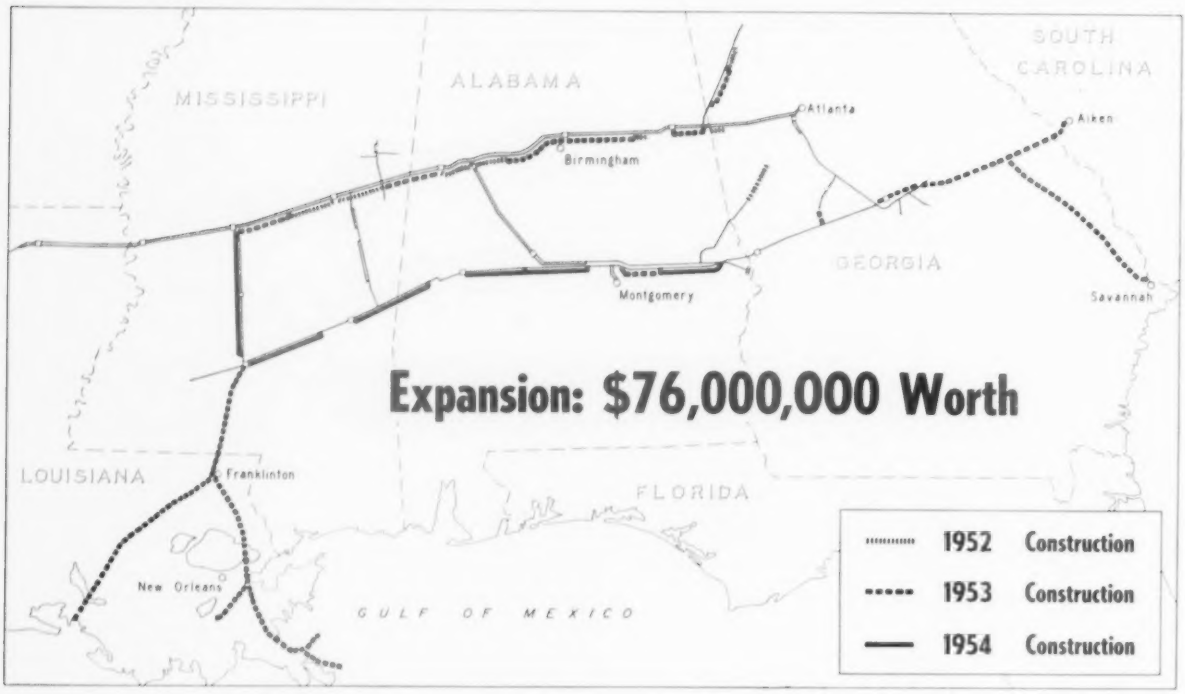
REFINING—International Refineries, Inc., dedicates new 11,500-bbl. refinery at Wrenshall, Minn. . . . ¶Anderson-Prichard Oil Corp. lets contract to Blaw-Knox Co. for construction of new 1,000-bbl. catalytic reforming unit at its Cyril, Okla., refinery. . . . ¶Indiana Standard dismantling and salvaging first crude distillation units in Kansas at its 20,500-bbl. Neodesha refinery. . . . First of old stills were erected in 1897. . . . ¶Atlantic Refining Co. granted quick tax writeoff by ODM for 8,000-bbl. cat reformer at Port Arthur, Tex., plant. . . .

TRENDS—The general reduction in refinery runs in recent weeks has amounted to 257,000 bbl. daily. . . . Total runs for the 6-week period ended October 24 averaged 6,900,000 bbl. daily compared with 7,157,000 bbl. daily for preceding 6 weeks. . . . Largest volumetric reduction was reported for the Illinois-Indiana district, down 71,000 bbl. daily. . . .

ACTIVITY—Production of crude and lease condensate averaged 6,158,850 bbl. daily for week ended October 24, down 125,550 bbl. daily. . . . ¶Total well completions for the week increased 65 wells to 1,078. . . . ¶Wildcat completions gained 45 wells to 232. . . . ¶Rotary rigs operating in the United States dropped 64 rigs during the week ended October 26 to 2,696. . . .

INTERNATIONAL—Survey shows Free World crude production decreases 107,400 bbl. daily in August. . . . Canada, Kuwait, and Iraq register only gains. . . . ¶Drilling picks up in Venezuela during September. . . . ¶London strike of tank truck drivers collapses after British troops begin making deliveries. . . . ¶Low tanker rates offering new Trans Mountain crude line stiff competition. . . . Persian Gulf crude selling 8 cents cheaper than Canadian crude in San Francisco. . . .

DRILLING—Ohio Oil Co.'s Paloma field test, already the world's deepest hole, nears the 21,450-ft. mark, making it almost 1,000 ft. deeper than any well ever drilled. . . . The well is still in the Tumey shale of the lower Miocene. . . . ¶A California Supreme Court decision paves the way for a resumption of work on Monterey Oil Co.'s drilling island offshore from Seal Beach. . . . Seal Beach contention that its police powers extend to the 3-mile limit overruled. . . . ¶First of 16 wells in Tioga and Beaver Lodge is spudded in in Williams County, North Dakota. . . . The wells are being drilled under contract granted Donnell Drilling Co. by M. B. Rudman, Dallas. . . .



Huge Gas Program Nearing End

Southern Natural pushes work on last segment of tough 450-mile supply project in southern Louisiana swamps

William P. Sterne

BIRMINGHAM.—The last section of one of the most difficult and costly pipe-line construction projects ever undertaken will be completed by the end of the month.

The job, part of Southern Natural Gas Co.'s huge $76,000,000 expansion program, involved laying more than 450 miles of pipe in Louisiana swamp lands and under the Gulf of Mexico. About 200 miles of these lines were coated with a special concrete mixture and laid under water by marine lay barges.

When the final 17-mile section is completed, it will mark the end of a long fight to transport natural gas to market from the Mississippi Delta fields and offshore producing areas at Breton Sound and Main Pass.

The 17-mile branch line now being laid is from the "east leg" 20-in. line which was completed several weeks ago. At Franklinton, La., another 20 and 12-in. line, known as the "west leg," branches off southwesterly across Lake Pontchartrain to near Atchafalaya Bay. The two lines join a 24-in. line at Franklinton which runs north to Gwinville gas field in Mississippi, then on into the main Southern Natural transmission system.

Three-year program . . . Completion of the final segment of the Louisiana gas supply system will mark the end of the major portion of the company's 3-year expansion project, involving the laying of a total of 1,254 miles of loops and extension, and the addition of 22,250 hp. in compressor capacity to boost throughput to more than a billion cubic feet of gas per day.

In 1954 the company will lay about 250 miles of 16 and 18-in. lines to complete the over-all program.

Now under construction, in addition to the 17-mile Louisiana section, are: A 130-mile 16-in. extension of the main system to Aiken, S. C., and a few remaining miles of a 120-mile, 14-in. lateral running from the new extension at Wrens, Ga., south to Savannah. By the end of the year, Southern Natural expects to have all of these lines in operation.

The contractors . . . Southern Natural revealed plans for its construction program in 1952. The company let contracts in October of that year to Houston Contracting Co., Houston, and H. C. Price Co., Bartlesville, Okla., involving the laying of the first 833 miles of lines in Louisiana, Mississippi, Alabama, Georgia, and South Carolina. This figure included 352 miles of 24-in., 115 miles of 20-in., 239 miles of 16-in., 127 miles of 14-in., and multiple crossings of 16 major rivers, including two of the Mississippi.

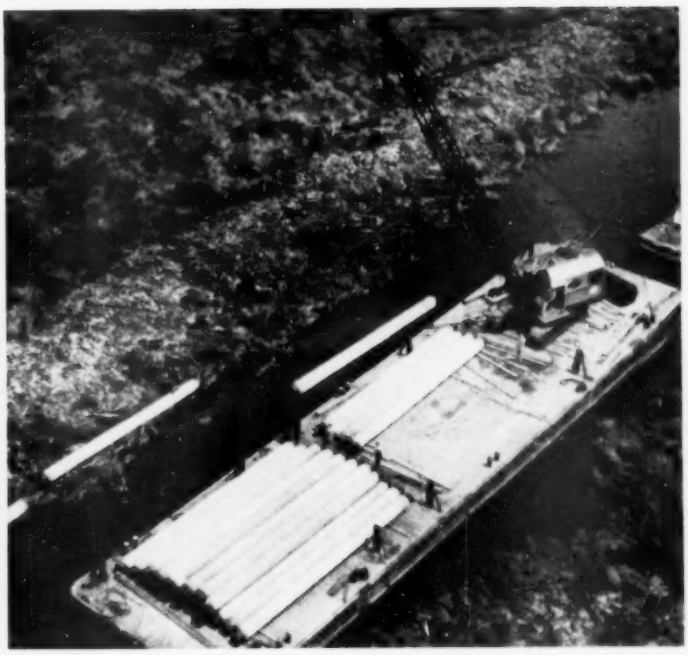
H. C. Price has also laid a total of eight loops between Kosciusko, Miss., and Carrollton, Ga., on the main transmission system from western Louisiana to Atlanta. Houston Contracting has laid about 637 miles of gas lines in the southern portions of Mississippi, Alabama, Georgia, and South Carolina. It also laid the 24-in. line from Gwinville, Miss., to Franklinton, La.

Brown & Root, Inc., handled the laying of the southern portion of the 20-in. leg supply system.

Latex Construction Co. of Georgia, a subcontractor, has been working on the 120-mile, 14 and 16-in. lateral from Wrens, Ga., south to Savannah.

Construction problems . . . The tough-

MISSISSIPPI DELTA REGION was crossed using dredges and big integrated lay barges.



STRINGING BARGES followed dredges in southern Louisiana, along canals averaging 40 ft. wide by 6 ft. deep.

est problems in the entire project were encountered on the Louisiana supply system where most of the specially concrete-coated pipe had to be laid under water from marine barges.

This portion of the project, comprising 43 per cent of the total expansion cost, involved:

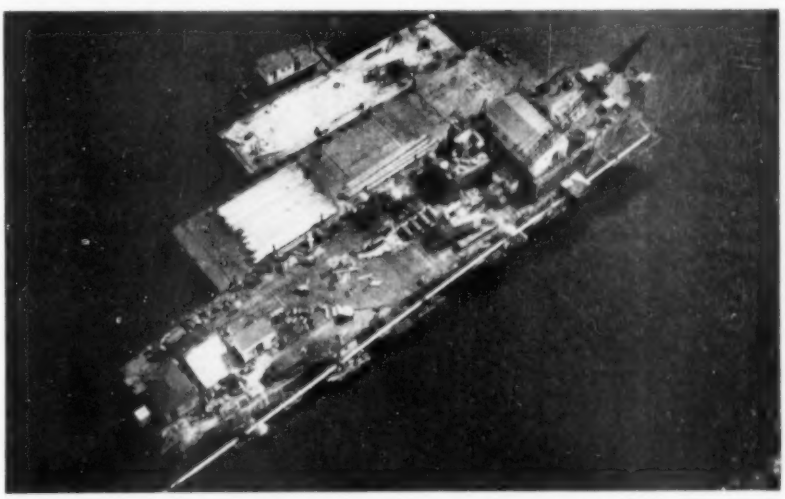
...Two multiple crossings of the Mississippi River. The crossings, completed early in the summer, comprised a total of six lines—four of them laid in 13 days at Carville on the west leg of the supply system and two in 9 days at Belair on the Barataria line which branches from the east leg.

Both of the multiple crossings were laid using the "series of opposing curves" technique worked out by Gen. P. H. Timothy, engineer in charge, in a previous Mississippi crossing.

Welders on the east bank triple-jointed the pipe for the Belair crossing to save laying time. A lay barge and four barges to aid in lowering the pipe were used for the crossings.

...A 20-in. submarine line under the Gulf to Breton Island. Here a converted naval landing vessel and a regular lay barge were used to lay the pipe, and a special jetting barge trenched the trough after the pipe was laid.

...An underwater crossing of Lake Pontchartrain and two crossings of the intracoastal canal. The Pontchartrain crossing also required use of a lay barge and a jetting barge. Together with the lay barge, several additional cranes were used in making the crossing of the busy intracoastal canal on the east leg. The



CONVERTED NAVY LANDING SHIP, the "Herman B," was used in the Gulf to lay the line to Breton Island.

STRETCHES LIKE THIS were closest approach to dry-land operations on the southern portion of the Louisiana supply system.

MOST MEASURING STATIONS, including this one at Main Pass, were placed on pilings.

HEAVY RIVER WEIGHTS were clamped on prebent 20-in. section for submarine crossing of intracoastal canal.

lines in this crossing were specially bent and weighted with heavy river clamps.

Four Brown & Root lay barges, literally floating pipe-line spreads, played major roles in the entire swamp-land construction. Each barge contained enough equipment to carry out the entire pipe-laying process. This included welding facilities, cranes, X-ray machines, doping and wrapping facilities, offices, radio room, spuds for anchoring in the canals, winches, a supply shack, and hot-dope pot. Sand barges accompanied the lay barges to provide fill for the trenches. Channels to accommodate the barges were dug 40 ft. wide by 6 ft. deep on the average. The pipe-line ditch then was cut about 10 ft. from the side of the channel.

Coating . . . A detailed study of the type of coating best suited for the miles of under-water lines on the southern portion of the supply system was carried out by the Southern Natural engineering department—Louis N. Brown, chief engineer; J. W. Bledsoe, assistant chief engineer; General Timothy, and J. Weldon, engineer—and the consulting firm of Ford, Bacon & Davis.

A special concrete coating containing barite finally was selected. This mixture was applied over layers of hot dope and glass felt. Thickness of the concrete coat, which ranged from 1½ to 3 in., was carefully regulated throughout according to water pressure, currents, tides, and other conditions to which the line would be subjected. A special membrane was used in the curing process. Coating was carried out at Harvey, La., for the east leg of the system from Lake Pontchartrain to Breton Sound and Main Pass and at Morgan City, La., for the west leg from the Mississippi River to near Atchafalaya Bay.

The coated pipe was welded aboard the lay barges using regular lineup clamps. The field joints were checked with radioactive cobalt "pills" placed inside the pipe which exposed film wrapped around each weld. The joint was doped and wrapped, then jeeped for holidays. The concrete coat was applied to the field joint using a wire-mesh reinforcement and a sheet-metal mold. The concrete was tamped solidly inside the metal mold with air hammers and the mold strapped shut. Special equipment, consisting of "shoes" and rollers, was used to keep the pipe from bending enough to crack the concrete coat during the laying process.

Measuring station . . . Several measuring stations were built by Southern Natural along the Louisiana supply lines, some on man-made islands, others on specially designed concrete platforms. Platforms were installed in the middle of Lake Pontchartrain to meter gas from Big Point field and at Coquille, near the California Co.'s production in the Gulf, also at Olga, Main Pass, and Duck Lake field. The Toca compressor station on the east leg of the supply system was built on concrete pilings to afford sufficient foundation for the three 1,100-hp. engines. This station will start up at the end of the month, marking completion of all new compressor installations in Louisiana.

Too Many Misses?

Nine wells for each discovery means geologists have too many wrong answers, Moody tells fellow geologists

Carl Hoot

SHREVEPORT.—Drilling nine wells to get one discovery means 2,500 or more petroleum geologists come up with 89 per cent wrong answers.

Clarence L. Moody, research geologist for Ohio Oil Co., used this graphic bit of current discovery statistics to press the importance of finding new oil to members of Gulf Coast Association of Geological Societies, gathered in Shreveport for its third annual meeting, October 22-24.

New oil, Moody said, can only be assured by the application of principles of fundamental research in the origin and general nature of sedimentary rock, and will require the combined efforts of everyone in the industry.

Preservation . . . Conservation is self-preservation, John B. Hussey, Commissioner of Conservation for the State of Louisiana, told the assembled geologists. Hussey credited present conservation practices to the oil industry and not to government.

John B. Hussey, Commissioner of Conservation for State of Louisiana, told the Gulf Coast Association of Geological Societies at Shreveport that conservation is self preservation.

ATTENDING the third annual meeting of G.C.A.G.S. are: William B. Oliver, Humble Oil & Refining Co., president, Corpus Christi Geological Society; Fred W. Bates, Gulf Refining Co., member Lafayette Geological Society and steering committee; Ralph W. Parnell, Shreveport, district engineer (Louisiana) and vice president, Core Laboratories, Inc.; Clay Reichert, Gulf Refining Co., member Lafayette Geological Society and member of steering committee; Hugh F. Crain, Phillips Petroleum Co., president, Lafayette Geological Society.

Hussey gave examples of above-ground waste and underground waste. Under the former he listed the drilling of unnecessary wells, inefficient storage of oil and the production of oil in excess of storage facilities or in excess of market demand. Improper storage, such as in earthen pits, he said, is subject to evaporation, fire hazards and deterioration in quality.

Underground waste includes the premature abandonment of wells and improper use of reservoir energy. If natural energies could be properly used, he said, a far greater amount of oil could be recovered.

Hussey pointed to the Caddo-Pine Island field in Louisiana as a model of conservation and a major contributing factor to his state's production. East Texas field, he said, is an example of pre-conservation drilling, where 30,000 wells were put down on approximate 5-acre spacing.

Technical session . . . C. N. Valerius, Shreveport consultant, presented a paper, the first of 17 papers at the meeting, on "How to Secure Exploration of Your Pet Areas Without Drilling," in which he pointed out few companies, if any, are financially able to drill every location they own. But, he said, the same results could be obtained by the ready dissemination of geologic information as it becomes available, and economic benefits from such publication far outweigh possible chance of revealing confidential data.

Preparation of geologic data for publication should be encouraged by companies, he contends, and specific assignments to this effect should be made by individual firms.

Stimulated thinking, geologic imagination and the exchange of ideas can bring about the drilling of wells to 15,000 or 20,000 ft. in the Arkansas-Louisiana-Texas area, where so far few wells have penetrated through the Smackover.

Reno Oil Properties Sold

HOUSTON.—R. G. Rice, Tennessee Production Co. president, has announced the purchase of all the oil and gas properties of the recently liquidated Reno Oil Co. involving almost 2,000 producing oil wells.

The Tennessee Gas Transmission Co. affiliate acquired the Reno properties from Mid-Way Co. and Northwood Oil Co., which had obtained them in the liquidation. Terms were not disclosed.

Involved are 878 wells in Texas and Oklahoma with a daily production of 5,100 bbl. and about 1,100 wells in New Mexico, West Virginia, Ohio, Kentucky, and Pennsylvania. Acreage acquired includes 28,861 acres of developed leases and 78,417 of undeveloped lands.

Lease Service Offered

AUSTIN.—A new service announced by the General Land Office of Texas provides lease information on all outstanding mineral leases on state-controlled submerged areas.

The service became available November 1, and has to do with outstanding leases on rivers, islands, salt-water lakes, bays, inlets, marshes, and reefs within tidewater limits, and that portion of the Gulf of Mexico within jurisdiction of Texas, according to Land Commissioner Bascom Giles.

A booklet prepared on the areas will contain following information: lessee, area, status code, part of tract number, tract number, land-office mineral-lease file number, lease date, acreage covered by lease, county code, and bonus paid.

EASTERN

Buckeye Opens Line

368-mile products system moves 100,000 bbl. daily

LINDEN, N. J.—One of the nation's largest and most modern products pipe-line systems was officially opened here by Buckeye Pipe Line Co. October 23.

The 368-mile Eastern Products Pipe Line System links refinery and deep-water port facilities at Linden with eastern Pennsylvania and central New York, terminating at Rochester and Syracuse. The line consists of 10, 14 and 16-in. pipe.

Initial capacity of 100,000 bbl. per day out of Linden can be increased to 150,000 bbl. per day by addition of pumping facilities. The common-carrier system cost $24,000,000 and took 2 years to build. It will handle 25 different products for 13 oil companies, delivering to 10 terminals located in Pennsylvania and New York. Its five pumping stations have a combined output of 11,000 horsepower.

Dedication . . . At dedication ceremonies held at Linden, George S. Patterson, Buckeye president, stressed the competitive aspects of the common carrier pipe line. The principal speaker, J. C. Donnell, II, president of Ohio Oil Co., credited the demand growth for heating oils as a major factor in the expansion of products pipe lines. While mileage in products systems has increased 40 per cent in the past 15 years, he said that product deliveries have almost tripled in the same period.

The following companies will ship products through the new Buckeye system: American Oil Co., The California Oil Co., Cities Service Oil Co., Crown Central Petroleum Corp., Esso Standard Oil Co., G.L.F. Farm Supplies, Gulf Oil Corp., Hartol Petroleum Corp., Richfield Oil Corp., Shell Oil Co., Sinclair Refining Co., The Texas Co., and Tide Water Associated Oil Co. Gasoline, kerosine, diesel fuel, and heating oil will be tendered separately for these shippers.

Investments Double

Latin America oil industry thrives on money from U. S.

WASHINGTON.—Direct investments of United States companies and individuals in the petroleum industries of Latin America jumped from approximately $600,000,000 in 1943 to $1,400,000,000 in 1950.

The current investment is probably a quarter-billion dollars or more greater, due to an increase of $1,000,000,000, to $5,700,000,000, in total U. S. investments since 1950 reported last week by the Department of Commerce.

A survey of foreign investments by the department showed that about 2,300 companies and individuals held controlling investment interests in some 7,500 foreign enterprises throughout the world in 1950. The assets of these enterprises at the end of that year were in excess of $22,000,000,000 of which the U. S. investment represented nearly $12,000,000,000.

The department found that $5,500,000,000 of the total assets of these enterprises was in petroleum, nearly four-fifths of it in Latin America.

Ninety per cent of the petroleum investment in Latin America in 1950 was concentrated in Venezuela, Brazil and Colombia, and the tanker fleet registered in Panama.

The Latin American enterprises in which U. S. investment was interested earned $905,000,000 before foreign income taxes. The foreign income taxes totaled about $250,000,000 and the foreign owners' share was about $40,000,000, leaving the return to Americans of about $615,000,000, of which over $100,000,000 was retained in Latin America.

The department reported that of the $615,000,000 earned in Latin America in 1950, Venezuela led with $232,000,000, the greater part of it from petroleum operations.

Court Awaits FTC Decision

WASHINGTON. — The Federal Trade Commission will advise the circuit court at Chicago this week of its position on the motion of Standard Oil Co. (Ind.) to have the so-called Detroit case returned to the FTC for further consideration.

The company's motion was based on the contention that there has been a change in the membership and viewpoint of the FTC since the present case was filed. Standard contends the commission should have an opportunity to take a new look at the issue of whether good faith in the cutting of prices to meet competition is an adequate defense against charges of class discrimination under the Robinson - Patman Act.

Commenting recently upon the case, FTC Chairman Edward F. Howrey said the question of law was settled by the Supreme Court last year in its decision that good faith was an adequate defense and a majority of the present commission follows that opinion.

Lease Ban Stands

Interior won't lift order barring Santa Ynez leases

WASHINGTON.—The Interior Department is standing pat on its order barring oil and gas leases in the Santa Ynez watershed area of the Los Padres National Forest in California.

The order, strongly opposed by oil interests, was issued on the recommendation of the Department of Agriculture, which has jurisdiction over the national forest. It was designed to protect the area, the principal source of water supply for municipal and irrigation needs of the Santa Ynez Valley. The Bureau of Reclamation is now spending $32,000,000 for construction of a dam and reservoir.

Following issuance of the order, the department held a public hearing in Santa Barbara at which an attorney representing applicants for oil and gas leases and a representative of a major oil company testified in opposition.

They told John B. Bennett, assistant director of the technical review staff, there are a number of other watersheds in southern California in which producing oil and gas fields have existed for many years without serious detriment to water supplies.

The department took the position that because of the extreme aridity of the area in summer, fire is the chief danger to the watershed. In addition the construction of heavy duty roads if oil and gas were discovered would increase the danger of erosion and siltation.

Pollution of the water supply might result from accidental spillage of oil over the land or from the flows of brine extracted with the petroleum, the department said.

In its refusal to rescind or modify the order, the department dismissed a contention of oil interests that if a productive field is discovered in the area substantial wealth and additions to the oil reserve valuable for defense purposes would be created.

"Modification of the order need not be considered," the decision stated, "unless the need for gas and oil becomes more urgent."

ASPPA Revamped

Policies on military oil centralized in one agency

WASHINGTON.—Revamping of the Defense Department under Republican administration has reached the Armed Services Petroleum Purchasing Agency.

A new charter for the agency was approved by Secretary Charles E. Wilson broadening its scope to include functions of an operational nature and programing formerly performed by the Office of Petroleum Programs and the Joint Petroleum Committee.

Purpose of the expansion is to achieve maximum effectiveness and economy in all aspects of the purchase and distribution of petroleum and related items and to provide information and data to the several defense agencies.

Under the reorganization, the basic work for the development of military oil policies will be largely centralized in ASPPA. In addition to the procurement of supplies it will take over the following responsibilities:

... **Maintenance** of records on world-wide tanker fleets and review of tanker construction statistics.

... **Review** of petroleum reporting procedures of the military services.

... **Standardization** and simplification of reporting procedures and preparation of industrial security guides for the petroleum and gas industries.

... **Study** and analysis of surveys of production facilities and oil resources.

... **Compilation** and consolidation of current and strategic data and statistics on domestic and foreign military and civilian petroleum consumption.

... **Development** of requirement programs for submission to the oil industry for purposes of scheduling for military supply.

... **Compilation** of a listing of all industry petroleum products available in the distribution system for foreign areas, indicating those products which do or do not comply with government specifications.

... **Maintenance** of industry technical liaison.

While continuing to represent all military services as a joint agency, ASPPA was put under the policy guidance of the secretary of defense, with the secretary of the Navy to exercise control and supervision through a directorate constituted, as in the past, of the supply chiefs of the three military branches.

Court Sets Answer Date

WASHINGTON.—A 40-day period in which to file answers to Alabama's suit against the tidelands act has been granted California, Louisiana, Texas, Florida, and the federal Government by the U. S. Supreme Court.

The Alabama suit seeks to have the "quitclaim" act declared invalid and the more than $62,000,000 royalty and other payments now held by the Government distributed among all the states so that Alabama could secure its "rightful share." The suit also attacks the law on the ground it threatens Alabama's fishing rights in those parts of the Gulf of Mexico over which other states would have control.

Import Action Unlikely

WASHINGTON. — The Eisenhower administration is "aware" of the problem of oil imports and "hopeful" of a solution, but it has indicated it will not take any action in the matter within the next 6 months.

More than 50 communications on the subject have been received at the White House in recent weeks. They are being sent to the Interior Department for acknowledgment and Secretary Douglas McKay has turned that job over to the Petroleum Administration for Defense, where a stock answer has been prepared.

Most of the letters to the President appear to come from citizens appealing to the administration to do something to curb imports.

"We fully realize the nature and extent of your problem," the writers are told in the PAD form letter. "There is, though, no agency of the Government that is now authorized to take summary action which would change the supply-demand situation in petroleum. The petroleum industry was built on the basis of competition and free enterprise, and I am confident you will agree with me that this system should be perpetuated.

"The administration is, however, aware of the problem created by petroleum imports. Everyone knows that imports affect the economics of domestic production, and everyone is hopeful of a solution that will be fair for the domestic producers, the importers, and the nation as a whole . . ."

WATCHING WASHINGTON

Bertram F. Linz

Oil's Trade Role Examined

Representatives of the oil industry probably will be asked in the near future to confer with the Commission on Foreign Economic Policy on the role played by petroleum in international trade.

The commission, set up by act of Congress and composed of 10 members of the House and Senate and seven private citizens, is directed to study and report on international trade and its enlargement "consistent with a sound domestic economy, the foreign economic policy of the United States, and the trade aspects of our national security and total foreign policy."

An invitation has been sent to trade associations and other organizations in the oil and other industries asking for written statements on specific problems. Already the commission has been snowed under by the communications.

The commission is required to report to the President and Congress by next March 3, which gives it only about 4 months for its investigation. It does not propose to make merely an "ivory tower" study, however, and plans to supplement the written statements it receives with across-the-table conferences by the staff with executives of major industries. Since international trade in oil involves not only the problems of export and import of petroleum but the ability of the producing countries to import other commodities, it is expected that oil men will be among those called in for these conferences.

New Steel Record Set

The domestic steel industry shipped a record 2,748,059 tons of steel to the oil and gas industry during the first half of this year, directly and through warehouses.

This was an increase of nearly 20 per cent over the volume of shipments in the first half of 1952, when operations were held down by steel strikes, but was considerably more, tonnage-wise, than could have been provided even if production had not been closed down.

There has been a substantial increase in the steel industry's capacity to produce pipe, much of which is in the Midwest and Southwest where it is near oil-country or pipeline projects.

Because of the rapid expansion of the steel industry, the figure on the percentage of capacity in operation no longer is an economic indicator. The figures to watch are those showing the tonnage of steel made or scheduled to be made.

Conclusions based on operating capacity alone are likely to be misleading. For instance, the steel industry currently is operating at about 88 per cent of capacity but more steel is being produced than in most active week of 1950 when furnaces were being operated at 103 per cent of that year's weekly capacity.

Congress to Halt Handouts

Congress next year will attempt to write into law the administration's decision that foreign countries can no longer depend on American government financing for their development but must make an effort to create a favorable climate for private investment.

Both Treasury Secretary George M. Humphrey and Commerce Secretary Sinclair Weeks have stated emphatically that the administration will not continue the Truman policy of large-scale handouts but will attempt to expand the role played by private capital abroad.

The Senate banking committee now is studying the question of our policy in the field of foreign investment and has set up a 121-man advisory panel from the oil and other industries to assist in the investigation.

The need for such a study was brought out by Humphrey, who told the panel last month that foreign petroleum investments have declined substantially and now are materially less than the total invested in all other industries together.

A number of countries have recently considered the question of foreign investments for resource development, but for the most part have taken only limited, and largely unsatisfactory steps to provide the conditions under which private American investment will voluntarily undertake developments on the basis of normal economic considerations.

What to Do About Imports?

- **Every independent has an idea but they agree only that there is no simple answer to a complex problem**
- **Many are reluctant to turn to Congress because they look askance at any government regulation**

Henry D. Ralph

FORT WORTH.—Control of imports was the all-pervading topic of discussion at the annual meeting of the Independent Petroleum Association of America, but there were almost as many ideas on how to do it as there were oil producers present.

There was complete unanimity that oil imports are too high and that "something should be done." But hardly two independents agreed on what that "something" should be.

The difficulty is not a lack of ideas, but a plethora of them. The independent producers admit that to date they have not come up with any answer which will suit everybody and therefore they haven't been able to present a united front.

And while they talk, imports are increasing faster than the rate of domestic consumption, with the result that domestic production is being curtailed, inventories are rising, and prices threaten to get mushy.

By no means all the members were enthusiastic about the resolution which the I.P.A.A. adopted. It embodied a three-point approach:

. . . Ask importing companies to hold their imports to 10 per cent of domestic demand.

. . . Ask President Eisenhower to get imports reduced, by persuasion or otherwise.

. . . Ask Congress for a law if the other two things don't work.

Many independents don't want any law, being constitutionally opposed to government interference in business. Others are convinced that nothing else will bring results and that a bill, backed by the entire domestic industry, should be ready for introduction the day Congress reconvenes in January.

So there is a move afoot to try to get agreement on a plan among the I.P.A.A. and the various regional associations of producers. If and when such a joint drafting committee gets together it will have plenty of suggestions to mull over, judging by the number of ideas that were tossed about in corridor conversation during the I.P.A.A. meeting.

Here is a sampling of what various individual independent oil producers think might be done about the imports problem:

High tariff . . . Some, in desperation, say slap on a high tariff at an arbitrary rate, say 50 cents or $1 per barrel (it's 10½ cents now). On reflection, most agree that this would be unfair, unrealistic, inflexible, and impossible to get through Congress.

Graduated tariff . . . There are several suggestions, mostly nebulous, to set a flexible tariff rate, tying it to some domestic index such as wholesale prices or cost of living. The basic thinking here is that such a plan might be more equitable and easier to get through Congress than a flat duty, and that it might provide more flexibility in the rate of imports by permitting imports to fluctuate in line with supply and demand.

Tax equalization . . . Foreign oil, the argument runs, contributes nothing to the financial support of the United States except a nominal import duty, while domestic producers pay an imposing array of taxes to federal, state, county, and school-district authorities. So some producers suggest adding up all taxes paid by domestic crude, averaging out a representative figure per barrel, and asking Congress to extract the same contribution from foreign producers in the form of an import duty at that rate.

Quota limitations . . . The real objective of producers is not to exclude all imports but to restrict them to what they consider a fair share of the market, so many say this should be done directly through a quota instead of indirectly through a tariff. Ten per cent of domestic demand, fixed annually, is generally considered "about right." But last spring the I.P.A.A. failed to get such legislation through Congress.

Peril point . . . A variation of the quota idea is a law directing the President to shut off imports when their volume becomes so great as to imperil the health and prosperity of the domestic producing industry. This sounds fine, but the chief difficulties are writing a precise and workable definition of how much is too much and devising a sure-fire, politics-proof administrative machinery for applying it.

Supplement, not supplant . . . Still another variant of the flexible-quota idea embodies the famous and almost hackneyed phrase from the industry's unanimously accepted statement of national oil policy that imports should "supplement but not supplant" domestic production. It is suggested that Congress adopt this as official government policy and make the President responsible for deciding when imports are supplanting and what to do about it.

Importers' agreement . . . Many producers believe that the big importers themselves don't want to upset the domestic apple cart by too-high imports but are powerless to curtail because of (1) fear of antitrust prosecution if they get together, (2) pressure of the producing countries for more dollars, and (3) the prospect that if one or two cut down some other importer will increase his shipments.

So it is suggested that Congress authorize the White House or some government agency to give official blessing and immunity to a voluntary agreement limiting imports to some reasonable portion of the domestic market. Then, with the support of our State Department, importers could insist that foreign governments permit them to ship less to this country. The main hitch here is that domestic producers rather generally distrust what they feel is a "one world" philosophy in our State Department.

Country discrimination . . . The imports that irritate the independents the most are those from the Middle East, because they are the latest in the field, come from the biggest reserves, and probably have the lowest producing costs. But it is realized that under the traditional American most-favored-na-

tion policy it is impossible for Congress to make an outright discrimination among importing countries. Such objectives are always accomplished through some diplomatic double-talk or tariff "classification." So three different political devices are suggested.

Defensibility . . . One idea is to permit imports (or duty-free imports) only from sources which could be easily defended in case of war. This would favor the Western Hemisphere in general and Canada in particular. The logic here is that the main reason why we need imports, and why our Government encouraged American oil companies to develop foreign reserves, is to have a supplemental supply in case of war, but Persian Gulf ports and the long tanker lanes from them would be prime targets for any enemy in a global conflict. So why build up dependence on an undefendable supply?

Reciprocal trade . . . A second idea for "differentiation without discrimination" is to devise some law to favor oil imports from countries which buy heavily in the United States. This again would favor Canada and Venezuela, two of our best customers, and would penalize the sterling bloc countries of the Middle East. This idea is hoped to appeal to those who defend imports in general as essential to our world trade and our export markets.

Contiguous territory . . . Still a third possibility is to favor oil from contiguous nations, such as putting restrictions or tariffs on tanker-borne oil but admitting it free if imported by pipe line. This might or might not favor Mexico, which does not have a huge exportable surplus of oil, but it would be an open invitation to Canada.

Independents have no fear of Canadian imports; in fact, most of them openly say that Canadian oil isn't "foreign" oil at all and should be treated exactly like United States oil. This is due to several reasons, including traditional U. S.-Canadian friendship, relative ease of military defense, belief that Canadian oil will never be so big in volume or so low in cost as to constitute a serious threat—and the fact that a great many independents have a financial stake in Canadian production.

World proration . . . One idea which independents unanimously oppose is an international agreement binding producing nations to prorate their exports on the basis of market demand in the various consuming areas. This suggestion has been advanced by global thinkers variously in the past, and was the heart of the Anglo-American Petroleum Agreement which the independents successfully fought and killed when it was submitted to the Senate for ratification shortly after the war.

The independents are thoroughly convinced that any such prorating body would be dominated by dollar-hungry foreign nations which, abetted by "international do-gooders" in our State Department, would prorate American production to a very small percentage of the American market and thus make things worse than ever for them.

Action without law . . . All the above suggestions would require some sort of action by Congress. A sizable number of independents oppose congressional action except as a last desperate resort, for several reasons—honest opposition to government regulation as a matter of principle, fear that regulation of imports would extend to federal regulation of domestic operations, recognition of the need for a degree of flexibility in the volume of imports desirable from season to season and year to year.

So, many independents are still searching for some solution which won't involve running to Congress for help. In this category the ideas are also diverse, and include:

Voluntary forbearance . . . Months ago the producers called on the importers to exhibit "industrial statesmanship"—meaning cut back imports by one way or another, but cut them. The theory was that the importers would rather do this voluntarily than run the risk that independents would get so mad they would ram a drastic law through Congress. Also, all the big importers have large producing properties in the United States, and it was expected that they would not let excessive imports weaken the price structure here and cause curtailment of their own wells in this country.

Some independents still think that the importers will see the light and make the desired downward adjustments in their importing schedules. But others point to the steady increase in imports and the forecasts of still higher shipments to come, and say that if that is industrial statesmanship they don't want any more of it.

Publicity . . . Some feel that if the independents give wide publicity to the importing schedules of individual companies and keep harping on the subject enough they can shame the importers into curtailing, or that the pressure of public opinion in oil-producing states (and from domestic production departments of the importers) will force some "voluntary" action.

They like Ike . . . Quite a few producers believe that President Eisenhower could solve the problem quietly and effectively simply through the power of his prestige and personality if the facts were explained to him. The reasoning: Eisenhower wants to maintain foreign trade and good international relations and also to maintain domestic prosperity; therefore he could quietly pass the word to importers and foreign producing nations to curtail shipments and thus stave off disaster to domestic producers and prevent the oil industry from becoming another administration headache like the farm problem.

Create a crisis . . . As imports have increased, states with market-demand proration laws have curtailed their output to the point where state revenues and internal economies are hurting. For example, Kansas ordered a dramatic 10-day shutdown of virtually all its wells; Texas school teachers are up in arms against imports because the reduced allowables in that state have reduced tax funds for the schools.

What would happen if domestic production were cut back still more drastically in almost all producing states? Would there be such a strong popular outcry that the importers, the President, Congress, or somebody would do something about it? Some producers think so, and favor letting things get worse in hopes of inducing a reaction for the better.

Out-compete them . . . Finally there are a few—a very few—independents who are so inde-gol-durned-pendent they dare to rely on the principles of free enterprise and open competition. They say they can out-compete the importers in a price war and get back their domestic market by aggressively fighting for it if the state proration laws will get out of their way.

They want the states to set maximum efficient rates of production for each well or pool and take whatever measures are necessary for protection of the oil reservoirs but set no allowables on the basis of market demand. Then every producer could produce up to his MER if he wanted to and sell the oil the best he could.

Of course this would cause an oversupply and the price of crude would fall. But they say the price wouldn't fall very much, perhaps 25 or 50 cents per barrel, but this would be enough to take all the profit out of importing. They believe that foreign oil really isn't cheap oil because of the high royalties, taxes, and operating expenses abroad and the cost of long tanker hauls. Domestic proration, they say, works to invite imports and maintain a price level to protect importers' profits.

It's not simple . . . All these ideas on what to do about imports were overheard by one reporter in the lobby of the Texas Hotel here between sessions of the I.P.A.A. There may be many more suggestions under discussion.

This points to two conclusions:

1. There is no simple solution to the imports problem.

2. Independent producers are so independent in their thinking that it won't be simple to get them to agree to present a united front on any course of action.

Higher Octanes Coming

99.7 octane premium gasoline believed possible by 1961 by widespread refinery adoption of catalytic reforming

George Weber

NEW YORK.—Gasoline octane numbers and compression ratios will rise hand in hand during the next few years and the motoring public will benefit with improved car economy.

The net effect on the nation's resources will be more ton-miles from every barrel of crude consumed, according to predictions voiced by two leaders in petroleum research and development.

Addressing the New York Metropolitan Section of the Society of Automotive Engineers, Eger V. Murphree, president of Standard Oil Development Co., foresaw a 15 per cent increase in car performance by 1961. He based his prediction on improvement in auto design and in gasoline quality by the addition of catalytic reforming to catalytic cracking in refinery operations.

Even accounting for the loss in energy attending the catalytic reforming step, he declared that a net gain of about 12 per cent in engine efficiency could still be forthcoming. His conclusions do not agree with some other current opinions that the efficiency gained from higher octanes through catalytic reforming would be more than offset by processing losses, with a net sacrifice in car performance based on crude resources. The increase in octane numbers forecast for the immediate future, said he, appears sound from both a consumer's and a raw materials conservation standpoint.

Saving predicted . . . William M. Holaday, director of Socony-Vacuum Laboratories, in a brief report on a continuing study by his company, forecast gradual increases in octane numbers and compression ratios. He said this trend will result in an eventual saving of $750,000,000 a year to American motorists. Granting that higher octane gasolines will probably cost more, he declared that motorists would still realize more miles per gallon because of improved fuel economies. In addition, the lower fuel consumption gained from engine efficiencies would ultimately result in substantial conservation of crude oil, "probably as much as 400,000 bbl. a day." Premium octane numbers up to 98 research and compression ratios of 10 to 1 will be made practical through improvements in engine design and fuel manufacture, he concluded.

Before the S.A.E., Murphree developed his points in a paper relating to balances in product yield and quality obtained with various combinations of cracking and reforming. These, he further related to expected car performance in ton-miles based on both gallons of gasoline and on the energy required to produce each gallon.

Hypothetical conditions . . . Murphree's estimated timetable indicates the possibility of 93.7 research octane for regular grade gasoline by 1961, with premium up to 99.7. This level, he said, can be reached by superimposing catalytic reforming on a processing sequence which makes full use of catalytic cracking of all available crude fractions.

The yield and quality balances, outlined in Table 1, are assumed for four hypothetical refineries designed to produce identical volumes of gasoline. These refineries are further assumed to be designed exclusively for fuel production. Hence, they are capable of producing somewhat higher octane gasolines than the average refinery, since there is no diversion of crude fractions to the manufacture of lubes, solvents, etc.

The prewar plant employs atmospheric crude distillation, plus thermal reforming and cracking and visbreaking of heavy ends. Refinery "A" employs two-stage crude distillation with maximum catalytic cracking of middle and heavy distillate stocks. Thermal reforming is added in Refinery "B" and Refinery "C" makes full use of catalytic reforming in addition to the basic processing found in Refinery "A."

A volume ratio of 70/30 is assumed for regular and premium gasoline production. All three postwar refineries have sufficient catalytic cracking capacity to process all available feed stocks, including heavy distillates from vacuum distillation. Catalytic reforming capacity is rated at something over half the total volume of straightrun gasoline and naphtha, for processing the heavier portions.

Murphree noted the improvement in both gasoline yield and quality attending the use of catalytic cracking. An improvement of 6 octane numbers accompanied a better gasoline yield. The same volume of higher quality gasolines is available in Refinery "A" from 10,000 bbl. per day of crude, as was obtained in the prewar plant from 11,100 bbl. per day.

The losses in yield attending thermal reforming are reflected in the higher crude requirement figure for Refinery "B." Substitution of catalytic reforming, said Murphree, entails little additional loss in yield over thermal reforming with a substantial improvement in quality.

TABLE 1—RESULTS OF FOUR HYPOTHETICAL REFINERIES

Refinery—	Prewar	A	B	C
To satisfy cars in—		1951	1956	1961
Research Octane No.:*				
Regular gasoline	82.0	88.0	91.6	93.7
Premium gasoline	88.0	94.0	97.6	99.7
Crude run, bbl. per day	11,100	10,000	10,340	10,350
Gasoline, bbl. per day	4,590	4,590	4,590	4,590
Middle fuels, bbl. per day	3,260	3,260	3,260	3,260
Bunker fuel, bbl. per day	3,040	2,040	2,135	2,120

*TEL/gal.: 2.00 cc. in regular, 2.75 cc. in premium.

TABLE 2—ENERGY BALANCE IN REFINING CRUDE*

Refinery—	A	B	C
Reforming step—	None	Thermal	Catalytic
Raw materials input	61.3	62.6	62.6
Middle distillate	18.9	18.9	18.9
Bunker fuel	12.9	13.5	13.4
Gasoline	24.0	24.0	24.0
Refinery fuel	5.5	6.2	6.3
Total output	61.3	62.6	62.6
Gasoline energy debit	29.5	30.2	30.3

*Billion B.t.u.'s/day gross heat of combustion.

TABLE 3—HIGHER RATING GIVES BETTER ENERGY UTILIZATION

Refinery— Reforming step—	A None	B Thermal	C Catalytic
Research Octane No.:			
Regular gasoline	88.0	91.6	93.7
Premium gasoline	94.0	97.6	99.7
Compression ratio:			
For regular	7.0	7.6	8.1
For premium	8.2	9.5	10.5
Ton miles/gal.*	43.1	47.0	49.8
Ton miles/MM B.t.u.*	281	300	317

*Assuming all cars just satisfied by gasoline produced.

TABLE 4—ENERGY UTILIZATION IS ALSO HIGHER DURING TRANSITION PERIOD OF REPLACING OLD CARS

Refinery— Reforming step—	A None	B Thermal	C Catalytic
Car population	1951	1956	1961
Ton miles/gal.*	37.7	40.9	43.3
Gasoline energy debit	29.5	30.2	30.3
Ton miles/MM B.t.u.	246	261	276

*For average of all cars on road.

The volumetric figures in Table 1 are converted to an energy basis in Table 2. Since most of the energy loss is encountered in processing for high octane gasoline, the B.t.u. figures representing refinery fuel (gas loss) have been charged in full to gasoline. The gasoline energy debit rises from 29.5 to 30.3 billion B.t.u.'s per day in raising the quality of both gasoline grades a total of 5 research octane numbers.

Table 3 relates gasoline quality to compression ratio assuming all cars on the highways are just satisfied by the gasoline produced. In this theoretical situation where cars are fully utilizing the quality in both grades, the energy utilization rises from 281 to 317 ton miles/MM B.t.u.'s, a gain of 11 per cent. Murphree emphasized that these calculations assumed first, that all gasoline would be used in cars designed for exactly the octane numbers listed, and that the higher power available would be used to get more mileage and not to get better performance such as more rapid acceleration.

Time to tell . . . "From a practical standpoint, however," he noted, "the car population at any given time is such that the energy utilization shown in Table 3 will not be fully realized until some years after the higher octane gasoline is on the market. Initially, there would be a high proportion of older cars with lower compression ratios. However, based on the estimated car population and compression rate distribution for the cars on the road in 1956 and 1961, the energy utilization is still better for the higher octane number situations. Table 4 shows that ton-miles/gallon increases from 37.7 to 43.3, while ton-miles/MM B.t.u. increase from 246 to 276."

The trend to higher octane number fuels has been sound in the past, from the standpoint of both the consumer and conservation of the nation's raw materials, concluded Murphree. Based on the best forecasts for the future, he said an orderly increase in fuel octane number and engine efficiency will result in still greater conservation of our natural resources.

Differences of opinion . . . In these conclusions, Murphree noted that they did not agree with implications made by the President's Materials Policy Commission. The petroleum industry, he said, is carrying out its responsibility for making the most effective use of the nation's oil resources in producing the nation's gasoline.

The SOD study was received in oil and automotive circles as an important contribution to a subject on which honest differences of opinion are conceded to exist. Some observers take no issue with the theory that higher octane fuels offer the possibility of greater efficiency and conservation. But they doubt whether the potential power will actually be translated to sufficiently greater road economy to justify the cost in energy and dollars.

The emergent problem of preignition leads other oil industry research personnel to feel the whole concept of the octane-compression ratio relationship may be over-simplified. They tend to reserve judgment until more is known concerning this very complex problem. It is impossible, they point out, to estimate with any accuracy, the weighted average compression ratio of the car population at any time, since engine deposits may increase new-car compression ratios measurably. Hence, any study must of necessity either disregard this effect of deposits, or estimate it very roughly.

The loss of engine efficiency due to so-called preignition is believed by some to impose an important factor in calculating the energy balance of future cars and fuels. They look for technical advances which will minimize this preignition factor, but until the whole subject of combustion irregularities due to deposits is better understood, they honestly doubt that conclusive proof exists on either side of the question. It is generally conceded that although studies similar to the one presented by SOD may not meet with unanimous agreement, they contribute much to the understanding of a complex problem of national importance.

"Cyclones" Are Part of World's Biggest Cat Cracker

These bomb-shaped "cyclones" are part of the new equipment being installed at Shell Oil Co.'s Norco, La., refinery as part of a $40,000,000 expansion program. The cyclones, 44 of them, will be components of the world's largest catalytic cracking unit with a 48,000-bbl. daily capacity. The new cat cracker and other improvements will increase the refinery capacity 50 per cent to 75,000 bbl. daily.

Octane Numbers Rising

Latest duPont survey reveals 42 of 48 cities have higher octane premium gasoline today than at this time last year

OCTANE numbers of both premium and regular grades of gasoline are still moving up with gains for premium slightly ahead of regular, according to the latest quarterly survey by the petroleum chemicals division of E. I. du Pont de Nemours & Co., Inc.

Only four cities had lower averages for premium on the market at the first of October this year than at the same time last year. Of the remaining 44 cities covered by the survey, 42 had higher-octane premium than last year and two averaged the same as October a year ago.

The unweighted average of premium octane numbers reported for the 48 cities was 91.3 at the first of October compared with 90.5 last year for a gain of 0.8. Regular grade had an average octane number of 84.5, up 0.6 from last year.

The highest average octane number for premium was the 94.0 reported for Milwaukee, and the largest gain over last year was in El Paso, 90.2 this year compared with 86.0 last October. A total of 38 cities out of the 48 now have premium gasolines above 90 octane compared with only 32 last year.

Use of tetraethyl lead per gallon was slightly higher this October than a year ago for both premium and regular grades of gasoline but less than the average for last July.

Regular gasoline in seven cities contained more TEL than the premium gasoline marketed in these cities, but the premium from all cities averaged 2.34 cc. per gallon compared with 2.02 cc. for regular.

COMPARISON OF MOTOR-GASOLINE SURVEYS
(Octane numbers are by research method, arithmetic averages by cities)

	Premium				Regular			
	Octane number			TEL cont. cc./gal.	Octane number			TEL cont. cc./gal.
	Oct. 1952	July 1953	Oct. 1953	Oct. 1953	Oct. 1952	July 1953	Oct. 1953	Oct. 1953
Aberdeen	88.9	89.4	88.9	2.07	82.7	83.4	83.1	1.67
Amarillo	88.3	88.6	90.0	2.34	80.9	81.1	81.4	2.31
Atlanta	92.3	92.6	92.8	2.16	85.2	85.8	85.8	2.48
Bakersfield	89.1	89.1	89.8	2.67	81.2	80.7	81.8	1.61
Baltimore	92.3	93.0	93.1	2.48	87.2	87.6	87.5	1.97
Boston	92.7	92.4	92.9	2.29	87.5	87.7	87.4	2.37
Calgary	87.4	87.9	88.2	2.93	81.4	82.4	82.5	2.64
Casper	89.7	89.1	89.0	1.56	82.2	81.8	82.0	1.30
Charlotte	92.3	92.1	92.4	2.23	85.3	85.8	85.8	2.43
Chicago	90.3	90.1	90.6	2.22	83.2	84.1	84.0	1.94
Cincinnati	91.4	92.0	91.8	2.52	86.1	86.6	86.6	2.25
Cleveland	91.7	92.4	92.4	2.74	87.0	87.8	87.6	2.14
Columbus	91.9	92.1	92.1	2.52	87.1	87.5	86.7	2.03
Corpus Christi	91.3	91.9	92.1	2.56	83.8	84.7	84.8	2.46
Dallas-Fort Worth	91.8	92.1	92.9	2.69	84.4	84.3	84.9	2.50
Denver	89.1	89.1	89.2	1.75	80.7	80.8	81.8	1.35
Detroit	91.8	92.5	93.1	2.38	86.8	86.6	86.8	1.74
Edmonton	88.1	88.6	90.1	1.27	82.8	82.9	83.3	1.20
El Paso	86.0	89.3	90.2	2.53	76.7	80.4	81.3	2.51
Great Falls—Billings	90.0	91.0	90.9	1.61	82.6	83.2	83.3	1.70
Houston	92.0	92.2	92.6	2.67	84.9	85.8	85.3	2.59
Indianapolis	90.2	90.6	89.9	2.31	83.8	84.3	83.8	2.28
Jacksonville	92.2	92.1	92.0	2.20	86.0	86.3	86.0	2.33
Kansas City	90.1	90.0	90.4	2.42	83.0	83.5	83.8	2.00
Little Rock	91.4	92.0	92.5	2.48	84.1	85.2	85.3	1.95
Los Angeles	90.6	91.0	91.7	2.48	82.3	82.6	82.8	2.04
Louisville	91.3	91.8	92.0	2.40	85.2	85.5	85.4	2.46
Memphis	91.5	91.5	91.9	2.76	85.1	84.6	85.0	2.56
Milwaukee	90.7	93.5	94.0	2.37	83.6	84.4	84.2	1.76
Minneapolis	89.5	89.9	89.9	2.28	82.6	83.7	83.6	1.84
Montreal	90.4	91.1	91.8	2.01	85.5	87.3	86.6	1.47
Nashville	91.6	91.8	92.2	2.64	85.2	84.8	84.8	2.38
New Orleans	91.7	92.3	92.5	2.69	84.8	85.4	85.8	2.27
New York (Met. area)	92.6	92.4	92.8	2.44	87.0	87.6	87.4	2.06
Omaha	89.5	89.7	89.6	2.22	83.0	83.1	83.6	1.79
Philadelphia	92.3	92.7	92.7	2.42	87.1	87.7	87.4	2.33
Pittsburgh	92.5	92.3	92.3	2.45	86.8	87.6	87.6	2.43
St. Louis	90.2	90.0	90.3	2.53	82.7	83.3	83.6	2.33
Salt Lake City	88.3	88.5	88.7	2.04	80.1	80.3	80.4	1.50
San Francisco	91.1	90.9	91.8	2.47	82.0	82.2	82.3	1.69
Seattle	90.9	90.6	90.9	2.53	82.3	82.1	82.0	2.26
Shreveport	91.0	91.9	93.3	2.61	84.9	84.6	84.6	2.25
Spokane	89.9	90.3	90.8	1.89	81.9	82.2	82.3	1.96
Toronto	90.4	91.0	91.6	2.36	85.9	86.6	86.8	2.07
Tulsa	89.8	90.5	90.8	2.12	82.6	83.2	84.0	1.75
Vancouver	88.9	90.3	90.0	2.90	83.6	82.6	83.1	1.72
Wichita	89.1	90.6	89.6	2.47	81.8	83.1	83.0	1.71
Winnipeg	88.8	90.1	90.4	1.84	84.7	84.8	84.8	0.71

GENERAL COMPARISONS*

	Oct. 1952	July 1953	Oct. 1953
Premium:			
Research Oct. No.	90.5	91.0	91.3
TEL content (cc. per gallon)	2.25	2.39	2.34
Regular:			
Research Oct. No.	83.9	84.4	84.5
TEL content (cc. per gallon)	1.95	2.12	2.02

*Unweighted average of 48 cities.

Wire-Line Method Licensed

DALLAS.—Standard Oil Development Co.'s "permanent completion" method is being made available for the first time to the entire industry.

Otis Pressure Control, Inc., has been licensed to perform service operations using the new method.

The "permanent completion" method has been used by Humble Oil & Refining Co. to complete more than 1,000 wells, with a saving in rig time of 1 or 2 days or more in completing wells and a saving of about 60 per cent in the cost of workover operations.

Under this method the tubing and well-head equipment are installed on a permanent basis before the drilling rig is moved off. Perforating, testing, and completing are accomplished without the need of a rig, resulting in a saving in costly rig time. Workovers are performed with wire-line equipment, also without the necessity of a rig.

The new techniques have been under test by Humble for several years. Otis collaborated in the original research on the mechanics involved and has developed several of the tools used in the permanent completions.

Needed: Gas Yardstick

Though great gains have been made in measurement, error still costs industry millions every year, A.G.A. told

ST. LOUIS.—Probably one of the biggest boons imaginable to the gas-transmission industry would be the development at a reasonable cost of a 100 per cent accurate device for measuring the volume of gas flowing through a pipe line.

Such a device could save the industry many millions of dollars annually, F. M. Partridge, Southern California Gas Co., Los Angeles, told those who attended the thirty-fifth annual meeting of the American Gas Association held here October 26-28.

Accurate records of gas flow are required, Partridge said, for:

. . . **Control** of compressor station operation.

. . . **Studies** of pipe-line efficiency, determination of the need for cleaning, etc.

. . . **Determining** the dollar value of the gas handled.

Currently, he said, measurement accuracy of plus or minus 0.5 per cent is considered very good, and a tolerance of 1 per cent is usually acceptable. One large gas company last year delivered 281,800,000 M.c.f. Figuring cost of purchased gas at 20 cents per M.c.f., a measurement error of 1 per cent here would come to 2,818,000 M.c.f. valued at $563,000. Value of this same volume of gas at an average domestic selling price of 70 cents per M.c.f. would total $1,972,600.

Why the error? . . . Presently, one of the most reliable and accurate, and by far the most popular, measuring devices is the orifice meter. Basically, this meter is a flat round plate with a hole in the middle. A small hole or pressure connection is made in the pipe wall on each side of the plate and the drop in pressure as the gas passes through the orifice indicates the rate of flow.

This seems simple, Partridge said, and it would be except that no fluid conforms exactly to simple physical relations—especially gas. Thus, to achieve a reasonably accurate measurement it is necessary to determine and apply certain factors. These include the basic orifice factor, the Reynolds number factor, the expansion factor, the specific gravity factor, the temperature factor, and the supercompressibility or super-expansibility factor. Since temperature, pressure, gravity, and composition of pipe-line gas vary considerably, these factors have to be altered frequently to compensate for the changes.

Research and problems . . . Research work recently completed jointly by A.G.A. and the American Society of Mechanical Engineers indicates that large-diameter orifice meters can be used satisfactorily for measuring gas, Partridge said. The results of the study will be included in "New Orifice Metering Report," now being prepared for publication by the A.G.A. Among other things, the report will set forth installation specifications for plug valves, orifice fittings, and the finish of the interior surface of orifice meter runs. It is hoped, Partridge said, that the work of another A.G.A. research group will be included in the published report. This group has completed the development of a method whereby the supercompressibility factor can be accurately predicted from known characteristics of the gas.

Even with the completion of the present research projects, there will continue to be troublesome measurement problems, he said. These, all of which cause measurement error, include:

. . . **Pulsations** in the gas stream set up by compressors, liquid in the lines, pressure regulators, and unknown factors.

. . . **Changes in gravity** of the gas.

. . . **Extreme variations** in the rate of flow of gas.

. . . **Quick turn on** or off of large boiler loads at short intervals.

The ultimate objective of gas-measurement research is to maintain the highest practical accuracy at the lowest practical cost. It is possible, Partridge said, that in the future a new orifice meter gage will be developed that will be self-compensating and self-integrating so that the initial measurement figure can be used without applying the numerous factors now in use.

Corrosion-control coordination . . . Unless gas companies coordinate their corrosion-prevention activities to a much greater degree, they will be called to account in the courts, according to Hugh L. Hamilton, A. V. Smith Engineering Corp., Ardmore, Pa.

The rapidly growing number of underground structures and consequently of corrosion-control systems has made such coordination mandatory if widespread damage to underground structures near such control systems is to be avoided.

It is not unusual, Hamilton said, for stray currents from a corrosion-control system to be detected 10 miles from the source. If the total amount of electrical current is less than 1 amp., no aggravated interference effect usually is anticipated. However, any corrosion-control currents may reach or exceed 100 amp. Just 1 amp. of discharge from a control system for 1 year will dissipate roughly 20 lb. of iron or 70 lb. of lead on a neighboring underground structure.

The only way in which this hazard can be avoided is by the interchange of information between companies regarding proposed or operating corrosion-control devices, Hamilton said.

To avoid damaging another firm's property, he said, a gas company should:

1. Instruct properly trained engineers as to the possible attendant hazards regarding the property of others.

2. Allow sufficient time for the engineers to investigate the planned project thoroughly.

3. Explore new construction areas to determine location of other underground structures and what, if any, corrosion control means are employed.

4. Notify neighboring firms of planned cathodic protection schemes before installation so that interference tests may be conducted, of installation of drainage bonds whether to another pipe line or traction rails, of abandonment or alteration of any protective

New England's First . . .

First cat cracker in New England, a 24,000-bbl. per day Model IV fluid unit at the Everett, Mass., refinery of Esso Standard Oil Co. was dedicated last week. The Everett program included expansion of crude capacity from 38,000 to 50,000 bbl. per day, a new 7,000-bbl. per day rerun pipe still and new improved light ends facilities. The new fluid unit is integrated closely with other, revamped process units. The process units at Everett were constructed by the Foster Wheeler Corp.

scheme by which they might be affected, and of changes in electrical configuration that would alter the protective design.

New officers . . . New president of the association is Earl H. Eacker, president of Consolidated Gas Co., Boston. Other officers elected for 1-year terms at the meeting include: F. M. Banks, president of Southern California Gas Co., first vice president; Dean H. Mitchell, president of Northern Indiana Public Service Co., second vice president, and Vincent T. Miles, treasurer of Long Island Lighting Co., treasurer.

Directors elected for 2-year terms expiring October 1955 are: M. A. Abernathy, vice president of United Gas Pipe Line Co., Shreveport; B. C. Adams, president of Gas Service Co., Kansas City, Mo.; L. L. Baxter, Arkansas Western Gas Co., Fayetteville, Ark., and Frank A. Brownie, president of Canadian Western Natural Gas Co., Ltd., Calgary, Alta.

Other directors elected include: Sheldon Coleman, president of Coleman Co., Wichita, and W. H. Davidson, vice president of Transcontinental Gas Pipe Line Corp., Houston.

Crude Allowables Fluctuate

Allowable crude production will be increased in November by Louisiana and Kansas and cut in Oklahoma.

Louisiana restored 63,000 bbl. of an 87,000-bbl. cut in the production allowable for October, raising the November figure to 679,000 bbl. daily. John B. Hussey, Louisiana conservation commissioner, said the state's cut in actual production in October amounted to almost half the national production decline and that he felt this was out of proportion.

In Oklahoma, production from allocated pools will be cut an additional 10 per cent in November. The cut is expected to bring production down to a level near the 485,000-bbl. allowable set for October.

Kansas set its November allowable at 295,000 bbl. daily. This actually will represent an increase in production, even though the October allowable was 300,000 bbl. daily, due to the emergency 10-day shutdown imposed in the state in October.

The Kansas Corporation Commission, meeting in Wichita, also lifted all restrictions on secondary-recovery operations in November. Jess Robertson, chairman, said the agency approved the 295,000-bbl. allowable even though it will cut production from prorated wells below the state-set legal minimum of 25 bbl. daily. "The commission," Robertson said, "feels it has broad powers to prevent economic waste from any cause."

A.P.I. Will Honor Otto Donnell

SOON after it became apparent the United States was going to need every available gallon of gasoline it produced if it were to meet the worldwide onslaught of the Nazis and the Japanese, an ancient electric automobile startled the citizens of Findlay, Ohio, as it rolled down the street.

Behind the wheel of the relic was Otto D. Donnell. Findley's citizens knew him as the president of the Ohio Oil Co. and a few knew that he was among the oil industry's leaders who counseled Washington on matters of wartime gasoline and fuel conservation.

Donnell dug up his ancient transportation for the simple reason that it did not operate on gasoline. He did not feel he could preach gasoline conservation to everyone else without observing it in the strictest sense himself.

Next week in Chicago, that man, now retired, will receive the American Petroleum Institute's 1953 "Gold Medal for Distinguished Achievement," regarded as one of the nation's top industrial awards. Details of Donnell's citation will not be made public until a hand-lettered scroll accompanying the medal is read to a general session of the Institute's meeting.

Donnell, now 70, began his career as a mechanical engineer with Ohio Oil Co. in 1906. He was elected to the board of directors in 1910, became a vice president in 1913, and succeeded his father as president in 1927. He, in turn, was succeeded by his eldest son, James C. Donnell II, in 1948.

OTTO D. DONNELL

A charter member of the A.P.I., he served on its board of councillors from 1919 to 1927 when he became a director. He was A.P.I. treasurer from 1935 to 1946 and a member of the executive committee until his retirement in 1948.

Grease Gets Tougher

N.L.G.I. told silicones, new organic thickeners produce compounds tested successfully at high speed, temperature

K. B. Barnes

CHICAGO. — Several new greases compounded from silicone oil and aryl-substituted ureas have shown in performance tests that they can be used for lubricating high-speed ball bearings at temperatures ranging from subzero to 450° F., members of the National Lubricating Grease Institute were told here last week.

Recent strides have been made in fluid lubricants, such as silicones, fluorocarbons, polyglycols, and silicate esters, and in grease thickeners, such as soaps, silica aerogels, and copper phthalocyanines. However, no grease has been available that could be used in wide temperature variations for lubricating ball bearings at high speeds.

In their paper "Substituted Ureas as Grease Thickeners," E. A. Swakon, C. G. Brannen, and L. C. Brunstrum, Standard Oil Co. (Indiana), Whiting, Ind., disclosed that silicones and an organic thickener show possibly the best promise of meeting these requirements. The problem has been to find an organic thickener having high melting point, chemical and thermal stability, compatibility with the oil, no harmful effect on the lubricant, and the desired particle size.

Indiana Standard's men found that the aryl-substituted ureas have the desired properties. Over 50 were prepared; para-substituted arylureido derivatives of benzene and biphenyl were the best. Greases compounded from these thickeners and silicone oil they found, are noncorrosive, thermally and chemically stable and have high melting points. In laboratory tests, several have repeatedly performed for over 500 hours in ball bearings operating at 450° F. and 10,000 r.p.m.

Electric motors . . . Although a number of excellent greases are now available for electric motor lubrication, the industry is always looking for something better. This improvement may be either longer life, perhaps literally "permanent lubrication," or satisfactory service over the extended temperature ranges called for by the trend toward greater power in smaller packages.

E. G. Jackson and E. R. Booser, General Electric Co., West Lynn, Mass., told the NGLI convention that enough experience and test data have been accumulated so that the problem may now be approached of designing the necessary properties into these improved greases. Values can be approximately assigned for bleeding rate, evaporation, and torque, which in turn depend on oil viscosity, soap type and soap concentration. Variations in the grease required by different types of bearings are recognized and can be specified.

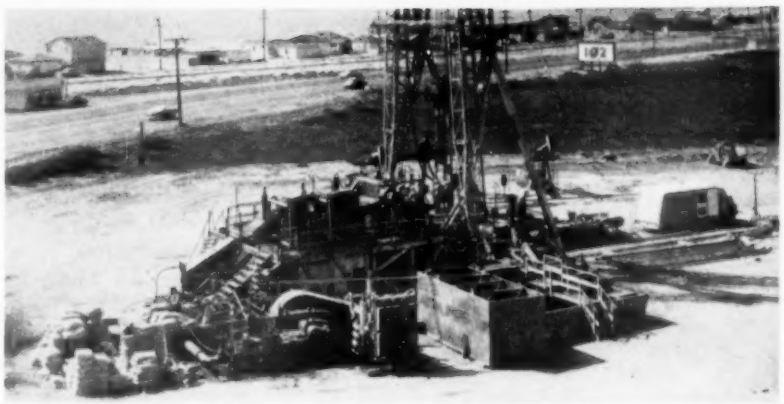
Bentone greases . . . With the continual increase in the number of Bentone grease compounders and the greatly expanded application of Bentone greases, a wide variety of variables in production methods, oil stocks and extraneous additives has entered the picture.

Robert E. Fariss, Baroid Sales Division, Houston, discussed production methods, correlated Bentone efficiencies, and showed how maximum benefit can be obtained from Bentone 34 by proper selection and use of dispersing aids.

Oxidized petroleum wax . . . Until recently, violent fluctuation in the price of natural fats has made the petroleum derived fatty acids desirable as a grease base. For some applications however, greases from oxidized wax now have been found to be comparable to greases from normal fats. J. C. Kirk and E. W. Nelson, Continental Oil Co., Ponca City, Okla., detailed the mechanism of wax oxidation and reaction variables. Of several oxidation catalysts investigated, they found a mixture of very finely divided manganese dioxide and zinc stearate to be particularly effective.

Bruce B. Farrington, administrative assistant to the manager of petroleum products research of California Research Corp., was awarded the institute's annual award for outstanding contributions to the lubricating grease industry.

Farrington was honored for his electron microscope investigations into the structure of lubricating grease. W. Wayne Albright, president of the institute, described Farrington's studies as typifying "the scientific advancement which has taken the industry from the old axle grease days to the present."



California Tidelands Test Nears 6,500 ft.

Slanted seaward, underneath the Pacific Coast Highway and under the beach homes, this offshore test of Monterey Oil Co. last week was nearing a drilled depth of 6,500 ft. Objective of 1 Newport Beach is Miocene sands at a vertical depth of about 6,000 ft. and some 1,700 ft. seaward of the well site. The wildcat, the first tidelands exploratory test from California beaches since Congress affirmed the state's title, is a joint venture with Humble Oil & Refining Co. If successful, and chances are believed good, beach property owners and the Pacific Railway will share in the well's production for granting the drilling easement.

Product Imports Gain

Commerce Department figures show August imports drop below July, but show increase over same month of 1952

John C. Casper

CRUDE and product imports for August averaged 52,000 bbl. daily more than for August of last year, according to data released by the Census Bureau of the Department of Commerce.

Most of the gain over last year was in refined products. Residual imports increased about 24,000 bbl. daily and other products, mostly unfinished oils, advanced 14,000 bbl. daily. However, the average for residual in August 1952 was the lowest for all of 1952 and about 9.9. per cent less than in August 1951. An important factor in residual imports last year was the decrease in demand resulting from reduced industrial activity during and following the steel strike. Residual markets are firm this year.

Crude imports were down 5,000 bbl. daily from July and up 18,000 bbl. daily from August 1952. The gain over last year was on the West Coast. Crude imports for that district averaged 78,400 bbl. daily in August of this year compared with 61,600 bbl. daily in August 1952.

Crude and product exports in August, excluding shipments to territories, averaged 12,000 bbl. daily less than in July and 56,000 bbl. daily less than last year. Compared with July, the important decreases were in shipments of gasoline and distillate fuel. Gasoline and residual exports were up compared with last year.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

Crude—	1953 Aug.	1953 July	1952 Aug.
Mexico	378	381	774
Colombia	1,317	1,340	1,287
Venezuela	10,109	9,277	9,940
Kuwait	2,778	†3,807	2,638
Saudi Arabia	3,142	2,490	3,305
Qatar	121	172	52
Canada	313	158	370
Far East	967	1,662	201
Total crude	19,125	19,287	18,567
Daily average	617	622	599
Products—			
Residual fuel	7,394	8,818	6,656
Other products	983	994	540
Total products	8,377	9,812	7,196
Daily average	270	317	232
Total all oils	27,502	29,099	25,763
Daily average	887	939	831

EXPORTS*

	Aug. 1953	July 1953	Aug. 1952
Crude	1,321	1,232	1,966
Gasoline	2,492	2,715	2,184
Kerosine	381	403	524
Distillate fuel	1,445	2,118	2,303
Residual fuel	1,727	1,398	1,585
Lube oils	1,134	1,105	1,610
Other products	802	716	875
Total all oils	9,302	9,687	11,047
Daily average	300	312	356

*Excludes shipments to territories. †Revised.

Spray Loading L.P.G. . . .

Eliminates tank car losses and may be used with the same economical results for truck loading, N.G.A.A. told

TYLER, Tex. — An innovation in L.P.G. transportation—spray loading of tank cars—has virtually eliminated loading losses which formerly ran as high as 5 per cent.

Latest information on spray loading was summarized by W. J. Rodgers, Magnolia Petroleum Co., Dallas, at the first fall regional meeting of the Natural Gasoline Association of America held here October 23.

Spray loading, Rodgers said, involves loading through the tank-car vent or outlet valve as opposed to the conventional method of filling the car through the eduction valve and pipe. Liquid enters the vapor line terminating at the top of the shell, and emerges into the car as a spray from the excess-flow valve in the line.

Normally, a pressure-type car has only one vent valve. Since the pop valve does not operate during loading, the vapor content of the car must be absorbed and condensed into liquid except for the portion left as outage. The spray from the excess-flow valve provides more intimate contact with the vapor and consequently absorbs a much greater proportion of it than can the rising, relatively flat surface of liquid using the old method.

The amount of heat created by the condensation of the vapor is the same for either method, provided the same quantities of vapor are condensed. The transfer of the heat to the spray from the vapor, however, is much more efficient than to the surface of the liquid layer. With the latter, heat would concentrate more in the liquid near the surface, thus causing an increase in tank-car pressure, Rodgers said.

Advantages of spray loading are threefold, he said. Its use permits:

. . . **Elimination of vapor venting,** which means increased gallonage and profits.

. . . **Reduction of loading time,** since fewer connections are required and less physical effort is involved on the part of the loader.

. . . **Reduction of equipment,** since one less hose, with accompanying fittings, is needed.

The only additional safety precaution required in spray loading, Rodgers said, is the necessity for watching tank-car pressure to prevent popping of relief valves.

Magnolia as yet has not tried loading tank trucks by the new method but believes spray loading can be applied here with the same success.

Packaged compressor plants . . . Three money-saving uses for packaged compressor plants operated in conjunction with natural-gasoline plants were detailed for N.G.A.A. attendees by E. S. McRoberts, J. B. Beaird Co., Inc., Shreveport.

Such a compressor plant, McRoberts said, varies in size from roughly 110 to 550 hp. and includes compressor, cooling equipment, lubricating system, manifolds, piping and scrubbers, and air-starting system.

It can be used profitably in the field in conjunction with a gasoline plant to:

. . . **Boost falling pressures** in gas-distillate fields.

. . . **Compress separator flare gas** from oil fields.

. . . **Compress low-pressure gas,** recycle vapors, and provide propane-refrigeration compression for the small packaged-type gasoline plant.

Traditionally, gasoline plants in gas-distillate fields have steadily increased absorber pressure for higher efficiency, McRoberts said. High-pressure wells in these fields feed into the gathering system at a relatively high pressure and flow into the absorber without additional compression. Gathering lines are small and designed to handle this high pressure. When field pressure begins to fall, flow from the wells will either cease or be sharply reduced. The operator must either install a field compressor or lower the pressure on the gathering system and install compressors in the gasoline plant itself. The latter method requires compression of all processed gas up to absorber pressure even though only a small percentage requires it, and considerable revamping of gathering system since a small high-pressure system could not handle the same volume of gas at the lower pressure.

The packaged compressor in the field would require no change in the gathering system and less total horsepower —the latter because as the first wells requiring compression are abandoned, the compressors can be moved to other wells and reused.

Flare-gas application . . . Savings average from 40 to 50 per cent in construction of systems to gather oil-field flare gas for processing in gasoline plants when the packaged compressor plant is used, McRoberts said. Installation of the field compressors, he said, will eliminate the need for the conventional large, low-pressure gathering lines, thus saving many tons (roughly 50 per cent) of steel and a substantial part of the cost of laying and wrapping the lines.

Since packaged gasoline plants are relatively small and generally installed in small fields, a packaged compressor plant can be designed and built to handle all compression requirements in one or two units, he said. For example, three stages of gas compression, propane-refrigeration compression, and recycle vapor compression can all be handled by one 550-hp. plant.

Phillips Wins Tax Suit

AUSTIN. — A Texas district judge has ruled that sulfur extracted from sour gas is not subject to the Texas tax on mined sulfur.

Judge Jack Roberts held here recently that Phillips Chemical Co. is entitled to recover $33,504 in taxes paid under protest. Phillips brought suit for a total of $63,903, but the judge said failure to amend the suit after payment of two $15,000 tax installments barred recovery of the full amount.

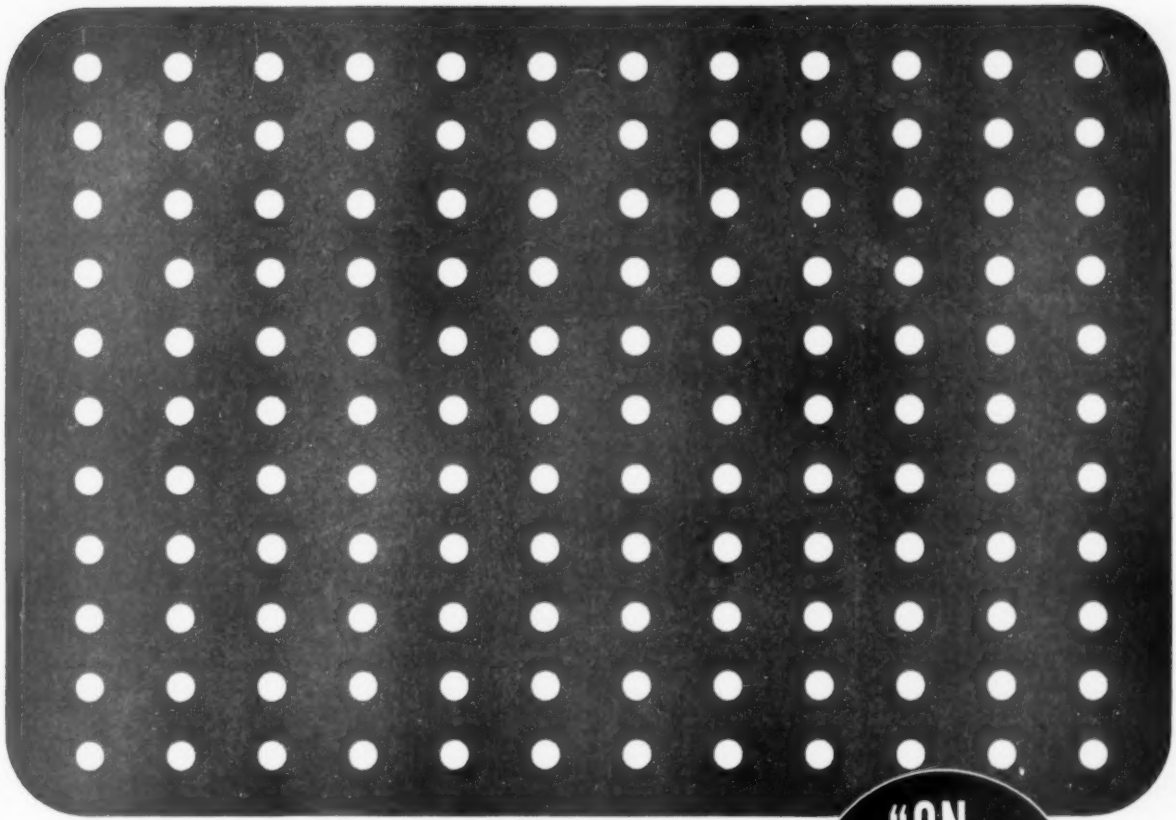
Half a dozen other companies paid an estimated $100,000 in sulfur taxes under protest after Texas began assessing the $1.40 per ton tax on mined sulfur against sulfur extracted from sour gas in Texas fields. Judge Roberts held that the present law does not cover the extracted product.

The sulfur involved in the Phillips lawsuit was produced at plants near Crane and Odessa, Tex. Atty. Gen. John Ben Sheppard said he will appeal the decision.

Louisiana Sets Lease Sale

BATON ROUGE.—The Louisiana Mineral Board will offer for lease 38 tracts of land covering about 69,000 acres, including several offshore tracts, here November 18.

Fifteen of the larger tracts are off St. Bernard and Plaquemines parishes in the Main Pass, Breton Sound, and Chandeleur areas. The five largest tracts contain 4,994 acres located in the latter two areas.



Hit Steel Pipe Requirements

"ON THE DOT"

Each of the dots shown above represents a different wall thickness-diameter combination of Armco Welded Steel Pipe—132 in all. With this wide selection you can meet your needs *exactly!* No longer is it necessary to increase costs by buying useless extra metal.

Diameters range from 6 to 36 inches, with wall thicknesses available from 9/64- to 1/2-inch. Lengths up to 50 feet simplify handling, require fewer joints, speed installation—and cut costs.

The fewer joints you do have to make are easier because of the uniformly beveled ends of Armco Pipe. In addition, you get uniform weldability and ample ductility for field laying by all standard methods. So job costs stay low.

Use Armco Welded Steel Pipe with confidence for conduits, gathering systems and wherever else you need dependable line pipe. Write for details. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 2623 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO WELDED STEEL PIPE

ARMCO

Line's Luster Dimmed

Trans Montain crude now faces stiff competiton from Persian Gulf, but expected changes make outlook brighter

Dahl Duff

THE economics of the new $93,000,000 Trans Mountain crude-oil pipe line are considerably less attractive at the present than they were when the project was first planned.

The sharp decline in tanker rates over the last 2 years and the consequent lower laid-down price of Persian Gulf oil has undermined the competitive position of Trans Mountain crude in possible export markets on the West Coast.

Considering present tanker rates and existing price levels, Saudi Arabian crude can be delivered into San Francisco about 8 cents cheaper than oil from the Trans Mountain line. Even at Vancouver, the terminal of the line, Persian Gulf oil appears to be on nearly equal terms with Canadian crude.

Over a period of time, however, there are several factors likely to improve the Trans Mountain's economic outlook. A rise in tanker rates and a downward trend of Canadian field prices would both tend to bridge the economic gap. In addition, Canadian crude has a slight edge over Middle East crude in refining quality at the present time.

Same old story . . . For the Canadian operator, the situation underlines a fact that has already been brought home to producers in many other parts of the world. This is the ease with which Middle East oil can move into most world markets, considering its approximate $1 lower price and the currently favorable tanker charters.

Here is how Persian Gulf and Canadian crude compare on a delivered basis in San Francisco:

	Canadian	Persian Gulf
Posted price	$2.68	$1.97
Field gathering	.10	
Trans Mountain tariff	.45	
Marine loading (Vancouver)	.02½	
Tanker freight	.07	1.28½
U. S. tariff	.10½	.10½
Total	$3.43½	$3.36

The field price for the Canadian crude is a mean between Leduc's $2.74½ and Redwater's $2.64½ in the ratio planned of one-third Leduc and two-third's Redwater. The gravity is two or three degrees higher than the 36° crude on which the $1.97 Saudi Arabian quotation is based. Actually, Saudi Arabian crude is now running 34° and 35° gravity and carries the correspondingly lower price of $1.93 or $1.95. Adding 4 to 6 cents to the Saudi Arabian price to equalize the gravity difference still leaves a slight advantage to the Persian Gulf.

The tanker rate given in the comparison for the 16,000-mile haul from the Persian Gulf to the West Coast is 40 per cent off the old USMC scale which fixed $16.30 per long ton for this shipment. Spot-market fixtures have dropped as low as 55 per cent off USMC, but a 40 per cent drop more nearly reflects current conditions. This level also is close to the break-even point for large oil-company owned tankers operating under foreign flags.

The USMC rate from Vancouver to San Francisco was equivalent to about 20.8 cents a barrel. The current rate is about one-third less. Half this, or around 7 cents, represents the actual charge of the shipment in view of a possible backhaul of residual fuel oil from California into the Puget Sound area.

For crude oil delivered into Vancouver, the figures are:

	Persian Gulf	Canadian
Field price	$1.97	$2.68
Gathering and pipe-line tariff		.55
Tanker freight	1.27	
Total	$3.24	$3.23

Brighter side . . . Over the long period, however, likely increases in tanker rates will improve the position of Canadian crude. In these comparisons, the ocean-freight element is the significant variable that gives crude from the Persian Gulf its currently favorable price. The spot market in tanker charters fluctuates violently over short periods, and while rates are not expected to return to USMC plus 150 and 200 per cent—which prevailed shortly before construction began on the Trans Mountain line a year and a half ago—a gradual firming of the market has been indicated by recent fixtures.

Comparisons such as these fail to take into account a number of factors. One important one is the internal cost of production and transportation in an integrated company operation in contrast to posted crude prices and spot-market tanker rates. Another is refining quality of the crudes.

Nevertheless, on the face of the matter, Canadian crude moving through the Trans Mountain line faces competitive difficulty at this time in achieving large-scale throughput from sales for export. Publicly held stock in the pipe-line company has fallen considerably in the securities market in the last few months.

Capacity crude . . . Initial capacity of the line is placed at 120,000 bbl. daily, and with the completion of a fourth station in December, this will be raised to 150,000 bbl. daily. A total of 200,000 bbl. daily can be moved with the addition of two more stations.

The prospects are that the line will operate considerably under capacity for some time to come. Deliveries will be about 15,000 bbl. daily initially, rising to 45,000 bbl. daily by the end of the year. This is the crude that can be taken by the refineries at the end of the line, Imperial at Ioco, Shell at North Burnaby, and Standard of British Columbia (Standard of California) at Burnaby. Next year, the Royalite refinery at Kamaloops and the General Petroleum plant at Ferndale, Wash., with 5,000 and 35,000 bbl. daily, respectively, should bring outlets for the line up to a total of 85,000 bbl. daily.

The outlook several years hence is more encouraging. The new Shell refinery near Seattle is scheduled to come on stream in 1956 with a 50,000-bbl. daily capacity. The area near the end of the pipe line in the Pacific Northwest has a rapidly rising consumption estimated at 300,000 bbl. daily, and, by that time, the tanker freight rates may have moved upward to the benefit of the new line. Another possibility, not overlooked in the industry, is a downward adjustment of Canadian field prices which would widen the competitive area for the oil.

Refinery to Double Output

EDMONTON, Alta.—Due to greatly expanded gasoline demand in Western Canada, McColl-Frontenac will double the capacity of its Edmonton refinery. The existing plant, placed in operation just 2 years ago, has a crude capacity of 5,500 bbl. per day plus 2,200 bbl. per day in coking capacity, a 2,600-bbl. per day fluid cat cracker

and a poly unit capable of producing 250 bbl. per day.

McColl-Frontenac will raise processing capacity to 11,000 bbl. per day with a $4 million project scheduled for completion in 1955. The program will bring the company's total refining capacity to 69,000 bbl. per day, including the recently expanded Montreal refinery, now capable of processing 58,000 bbl. of crude daily.

Lease Brings $1,000,000

EDMONTON, Alta.—Top price paid in the most recent Alberta cash bonus auction of petroleum and natural gas leases and crown reservations was $1,099,000 by Canadian Gulf Oil Co. for the only quarter section offered in the North Big Valley field.

The auction brought the Alberta Government nearly $8,000,000. Two previous sales this year produced $12,902,400.

In the most recent cash bonus sale, Hudson's Bay Oil and Gas Co., Ltd., purchased rights for one quarter section in the Armena producing area for $526,202. Shell Oil Co. paid $675,040 for a quarter section in the Fenn oil field, while a neighboring 160 acres was purchased by Canadian Gulf for $255,000.

Ten leases in semi-proven areas sold for a total of $2,770,920 and six crown reservations, allowing the purchaser to make only geophysical examinations, for $2,224,348.

Refinery Repair Contract Let

BRANDON, Man.—Refinery Engineering, Ltd., Toronto, has been awarded the contract for rehabilitating the Anglo-Canadian Oils, Ltd., refinery damaged by fire here October 10.

Damage estimated at $250,000 was greatest in the pump house and control room area with some damage to the reactor chamber and general piping in the plant.

WEST COAST

West Coast Imports Cut

SAN FRANCISCO.—Plans to curtail imports of foreign oil into California by 15,000 bbl. daily during the last quarter of this year have been announced by T. S. Petersen, president of Standard Oil Co. of California. An additional reduction of about 9,000 bbl. daily to start the first quarter of next year is also scheduled by the firm.

Imports are now being leveled off to meet market requirements and to maintain the present reasonable working inventories, he said. Standard imported about half of the 100,000 bbl. coming into the West Coast daily during the second and third quarters of this year.

The import reduction has been lauded by Ernest O. Thompson, chairman of the Texas Railroad Commission, who urged other oil importers to follow Standard's lead. Praise of the firm's action also has been voiced by the Texas Independent Producers & Royalty Owners Association.

Work on Island to Resume

LOS ANGELES.—Monterey Oil Co. will resume work on its drilling island 1½ miles offshore from Seal Beach within 2 weeks, according to Howard C. Pyle, company president.

The California Supreme Court denied the contention of Seal Beach that the city has police powers out to the 3-mile limit and cleared the way for resumption of the project. Construction was halted a year ago when the city filed suit claiming Monterey was violating an antidrilling ordinance and then carried the fight to the Supreme Court.

Pyle said that the first of three exploratory test wells will be spudded immediately following completion of the earth-filled island, located in 45-ft. water. An island capable of holding several hundred wells will be erected if the tests prove extensive oil reserves underlie the 1,400-acre state-granted lease. It was proved productive in 1948 by a slant-well drilled from an upland site 2,400 ft. inland.

The planed exploratory wells will test the entire sequence of horizons normally encountered at Wilmington, but which could not be evaluated in earlier tests because of the high deviation from vertical.

Ohio Test Nears 21,450 Ft.

BAKERSFIELD. — Ohio Oil Co.'s deep test in the Paloma field 17 miles southwest of Bakersfield last week was nearing the 21,450-ft. mark, almost 1,000 ft. deeper than any well has ever before drilled.

The test, 72-4 K.C.L., now has been drilling for more than 2 years. It was spudded on Oct. 23, 1951.

When the last core was taken, at 21,286-92 ft., the well was still in the Tumey shale of Lower Miocene, according to the paleontologist's call. Objective is the underlying Oligocene or deeper Eocene formation. If either is not encountered shortly, drilling probably will be halted and and up-the-hole shows tested after pipe is set.

ROCKY MOUNTAIN

McPherson System Sold

DENVER. — Bay Petroleum Corp. has completed sale of its McPherson Pipeline System, McPherson, Kans., to the National Cooperative Refinery Association of McPherson. The sale involved about 125 miles of 3 and 4-in. line. The system was entirely devoted to gathering operations.

Bay's McPherson refinery will be shut down. The capacity of the plant was approximately 6,000 bbl. per day, about equal to the recent expansion of the Denver refinery. Marketing in Kansas and Nebraska will not be changed by the closing of McPherson refining facilities.

C. O. Garbrecht, Bay vice president, said that no plans for disposition of McPherson equipment have been formulated.

Bay recently modernized its plant at Chalmette, La., increasing capacity from 8,000 bbl. per day to 18,000 bbl. per day at the time of first turnaround of the newly completed cat cracker in April 1953.

Enlargement of this plant and the Denver plant will enable Bay to supply market requirements without the Kansas plant, according to Garbrecht.

First of 16 Wells Started

WILLISTON, N. D.—The first of 16 development wells in the Tioga and Beaver Lodge area to be drilled by the Donnell Drilling Co., under contract with M. B. Rudman, Dallas, has been spudded in in Williams County.

The well, the 1-A M. B. Rudman-J. B. Ramberg, is located in NW NE Section 32-156n-95w. Present plans are to drill to the Madison lime at 8,600 ft.

The first well was spudded in well in advance of the time provided in the contract awarded Donnell, Odessa, Tex., in September. All the wells contracted will be drilled on proved locations and all will be drilled to the Madison lime.

The acreage to be developed under the drilling program is part of 20,000 acres Rudman bought in 1949. The Dallas independent operator sold half that original block to Amerada Petroleum Corp. and Amerada opened production on the block.

Crude Output Declines

First cuts in foreign production since February combine with United States decrease to reduce Free World output

Dahl M. Duff

PRODUCTION of crude oil during August declined both in the United States and in non-Communist fields abroad.

The daily average for the Free World during the month was 11,967,700 bbl., a drop of 107,400 bbl. from July, or about 1 per cent.

Most of the total decrease took place in foreign production which was down 86,700 bbl. daily, or 1.6 per cent, from the previous month. Output in the United States was off about 21,000 bbl. daily.

The principal foreign declines occurred in Venezuela and Saudi Arabia. These drops were offset to some extent by gains in Canada, Kuwait, and Iraq. Total non-Communist foreign production averaged 5,385,200 bbl. daily against an average for the first 8 months of 5,295,000 bbl. daily. The total Free World production in August of 11,967,700 bbl. daily compares to a January-August average of 11,828,000 bbl. daily.

Drop anticipated . . . The drop in foreign production was the first since last February. Production declines abroad had been anticipated during the third quarter since it was felt the record high levels in the Middle East during the first half of the year had outstripped demand.

CRUDE-OIL PRODUCTION

(Daily average in thousands of barrels)

Country—	Aug. 1953	July 1953	Aug. 1952
W. Hemisphere:			
Argentina	78.5	78.3	67.1
Bolivia	1.3	1.4	1.3
Brazil	2.8	3.0	2.2
Canada	262.0	259.1	193.4
Chile	3.1	3.0	2.5
Colombia	103.8	107.7	109.0
Cuba	0.1	0.1	0.1
Ecuador	8.2	8.2	7.4
Mexico	193.0	190.0	212.3
Peru	45.3	45.0	43.7
Trinidad	60.5	60.5	59.0
Venezuela	1,682.1	1,731.4	1,724.8
Total	2,440.7	2,487.7	2,422.8
Europe & Africa:			
Algeria	2.0	1.9	1.4
France	7.3	7.1	7.1
Fr. Morocco	2.0	2.0	1.9
W. Germany	44.3	43.2	34.9
Italy	1.9	1.8	1.6
Netherlands	16.0	16.1	13.9
Egypt	46.0	46.5	44.2
United Kingdom	1.1	1.1	1.2
Total	120.6	119.7	106.2
Middle East:			
Bahrein	30.1	30.1	30.1
Iran	35.2	37.9	25.0
Iraq	595.6	591.1	440.0
Kuwait	875.6	869.5	710.6
Qatar	95.3	95.1	68.9
Saudi Arabia	856.6	909.7	816.6
Turkey	0.6	0.6	0.5
Total	2,489.0	2,534.0	2,091.7
Other Asia:			
British Borneo	101.5	101.1	105.2
Burma	3.4	3.4	2.4
India	6.3	6.3	6.0
Indonesia	209.0	204.7	174.2
Japan	6.0	6.1	5.8
New Guinea	4.8	5.0	4.7
Pakistan	3.9	3.9	3.6
Total	334.9	330.5	301.9
Total, non-Communist, foreign	5,385.2	5,471.9	4,922.6
United States	6,582.5	6,603.2	6,219.3
Total, Free World	11,967.7	12,075.1	11,141.9
Est. Russia and E. Europe:			
Austria	65.0	65.0	55.0
Romania	90.0	90.0	85.0
Russia	1,060.0	1,060.0	960.0
Other Communist	34.6	34.6	25.1
Total	1,249.6	1,249.6	1,125.1
World total	13,217.3	13,324.7	12,267.0

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these regions. Estimates have been made for certain other countries, particularly in Southeast Asia, for which completely current reports are lacking. Iranian production show is net output, not including recycled material. Other Communist includes China and Yugoslavia as well as the Soviet satellite countries in Europe.

TREND OVER THE LAST YEAR

1952—	W. Hemisphere less U. S.	Middle East	Total non-Communist foreign
September	2,417.8	2,168.2	4,994.8
October	2,455.8	2,175.1	5,047.2
November	2,504.9	2,174.7	5,098.7
December	2,561.3	2,092.1	5,075.0
1953—			
January	2,472.8	2,252.3	5,152.2
February	2,407.2	2,258.4	5,096.8
March	2,412.5	2,266.1	5,104.8
April	2,448.1	2,426.8	5,306.6
May	2,423.1	2,523.7	5,391.0
June	2,459.4	2,536.0	5,450.1
July	2,487.7	2,534.0	5,471.9
August	2,440.7	2,489.0	5,385.2

The total Free World production in August, however, represented an increase of 825,800 bbl. daily, or 7.4 per cent, over August 1952. Non-Communist foreign production was up 9.4 per cent over August of last year, while the gain in United States during the same period was 5.8 per cent.

Production in the Middle East, which had risen steadily since last February, was down 45,000 bbl. daily from July, but the total represented an increase of 19 per cent over August 1952. The August total of 2,489,000 bbl. compares to a Middle East average during the first 8 months of 2,410,800 bbl. daily.

Saudi Arabian production was off sharply, dropping 53,100 bbl. daily from the all-time record for the Middle East of 909,700 bbl. daily which Arabian American Oil Co. established in July. A small increase was shown in Kuwait. In Iraq, production gained slightly to reach a new record of nearly 596,000 bbl. daily. Of this total, about 492,000 bbl. daily was from the Kirkuk field.

Venezuela drops . . . Venezuelan production in August sank to its lowest level in 2 years. It was down nearly 50,000 bbl. daily, or 2.8 per cent, below July, and 121,800 bbl. daily, or 6.8 per cent, under the daily average for 1952. By weeks, production in Venezuela was: 1,728,600 bbl. daily for week ending August 3; 1,689,000 bbl. daily for week ending August 10; 1,654,600 bbl. daily for week ended August 17; 1,663,000 bbl. daily for week ended August 24; and 1,724,600 bbl. daily for week ended August 31.

Production in Colombia dropped back nearly 4,000 bbl. daily, despite the beginning of commercial production in Texas Petroleum Co.'s Tetuan and Ortega fields. During the month, these new areas produced 694 bbl. daily. The crude is moved to a new topping plant with 1,000 bbl. daily capacity at Guamo. Production by op-

erators in Colombia during August was: Shell 38,631 bbl. daily; Texas, 4,692 bbl. daily; Empresa, 34,618 bbl. daily; and Colpet, 2,863 bbl. daily. Condensate production by the Empresa averaged 2,452 bbl. daily.

New Canadian record . . . Canada's output reached another new record in August, gaining about 3,000 bbl. daily over the previous month. Further increases were in prospect for Canada with the opening of the Trans Mountain pipe line and the Lakehead extension from Superior, Wis., to Sarnia.

Although most of the crude production of metropolitan France continues to come from the St. Marcet field of Soc. Nationale des Petroles Aquitaine, a sharp rise in output during the last 6 months has been reported for Soc. de Prespection et d'Exploitation Petrolieres en Alsace which operates in the Steffelden area south of Pechelbronn. The company now has four wells reported to have a total potential of about 1,000 bbl. daily. The crude oil produced is highly charged with potash.

LATIN AMERICA

Drilling Picks Up

Rigs at work in Venezuela show increase in September

RIGS operating in Venezuela in September totalled 110, an increase of five over the previous month, but still nine less than the February high for this year.

Of this number, 32 or nearly 30 per cent, were drilling exploratory holes, and 68 or nearly 70 per cent were operating in Eastern Venezuela.

Mene Grande Oil Co. was running 35 strings, Shell was next with 23, and Creole Petroleum Corp. was third with 20. Among the eight other companies, Texas-Mercedes was first with 12 rigs, Socony-Vacuum Oil Co. of Veneleuza followed with eight, and six other companies were running from one to three rigs.

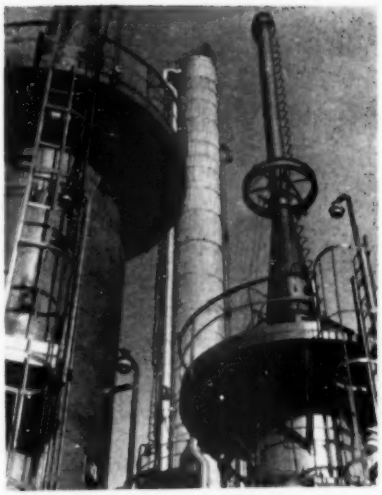
In mid-September, Phillips Oil Co. laid down three of their four active rigs, two in Bella Vista (Guarico) and one in San Roque (Anzoategui.) Socony stacked the rig operating in East Ruiz, which offsets Phillips' Bella Vista, and Texas Petroleum Co. laid down the string working in Rincon Largo, in the Anaco area of Anzoategui.

Wildcat . . . Of the three companies which have been wildcatting for an eastern extension to the central Oficina-Leona area of southeast Anzoategui, Mene Grande has apparently hit pay dirt with Adobe-1, which has now been logged at final depth between 7,500-8,000 ft. Testing has not yet begun, but the log is said to show four promising sands. Atlantic's Junta-3, several miles farther east, has been abandoned at about 8,500 ft. but the company immediately prepared to spud Junta-4 about 900 yards southeast of the discovery well, Junta-2.

Pancoastal's PCXP-1, the company's first well in Venezuela to be drilled independently of Venezuelan Atlantic, which normally does the operating for both, has now been abandoned at 8,100 ft. after lengthy testing. This hole which will be followed by another on the same seismograph feature, was about 5 miles west of Mene Grande Adobe-1 and 10 miles east of Meneg's Leona field.

Dual completion . . . Socony has made a successful dual completion of its Santa Fe-1, offsetting Mene Grande's recently discovered Siglo field. Shell is planning to start drilling again in Anzoategui in Eastern Venezuela, where the company has been inactive since it drilled two deep dry holes about 3 years ago. The program calls for six wells.

With CU-149, Creole is again seeking a deeper-pool pay in the Cumarebo field of Falcon. In the southwest of the same state, Texas Company was preparing to complete as a water well at just below 4,100 ft. its Tiguaje-3, which was to have been a follow-up to its recent oil discovery at Tiguaje-1.



New Unit Boosts Capacity

The new atmospheric distillation unit recently placed in operation by Barton Refinery, Ltd., at Trafford Park, Manchester, England. The view here is of the fractionating column and the two vertical up-draft heaters. The new unit has allowed an increase in throughput of the combined distillation plants at the refinery from about 2,500 to 3,500 bbl. daily. Barton Refinery is the newly created refinery operating company of Manchester Oil Refinery, Ltd.

EUROPE

Troops Move Gasoline

The British Government last week moved troops into London to make gasoline deliveries after a strike of tank truck drivers threatened a complete breakdown of motor traffic in the city.

The strike collapsed after 3 days of emergency deliveries by the military. At several meetings, the drivers voted to return to work, and an official of the oil-distributing companies said negotiations would be resumed on outstanding issues.

Earlier, dealer stocks were nearing exhaustion as a result of the walkout which began October 21. As preparations were made to bring in some 2,600 Army and Air Force drivers and helpers, the government set up a priority plan under which vehicles of hospitals, post offices, garbage collectors, and the food trades were fueled first.

The 3,000 workers struck in defiance of union leadership in a dispute over subcontracting and hiring of non-union drivers. They also demanded a raise of $1.40 a week over present pay which, without overtime, ranges from $20.35 to $21.60 a week. They are employed at terminals of the major oil distributing companies, including Esso, Shell-Mex and B. P., National Benzole, and Regent.

German Refinery Expanded

A new Thermofor catalytic cracking unit and a polymerization plant have been placed on stream at the Gelsenkirchen-Horst refinery of Gelsenberg-Benzin, A. G., in West Germany.

The cat cracking unit has a charge capacity of about 8,000 bbl. daily of distillates, semi-finished products, or crude oil. The third unit of its kind in West Germany, it was designed and installed by Hydrocarbon Research, Inc., New York, and Hydrocarbon Mineraloel, G.m.b.H., Dusseldorf. With the completion of the unit, the Gelsenkirchen installation has a crude capacity of 30,000 bbl. daily and 10,000 bbl. daily for catalytic hydrogenation. The cracking residues from the new unit are used as an injection product for hydrogenation.

The polymerization plant was built by Lurgi Gesellschaft fuer Waermetechnik, m.b.H., Frankfort, under license of the Lummus Co. In addition to these two projects, Gelsenberg is expanding the hydrogen-producing Linde unit, and on completion of the work, the facilities will have a capacity to produce about 280,000 cu. ft. of pure hydrogen per hour.

PERSONALS

Teamwork Pays Off

New Noble Drilling head relies on his organization

THE new president of the Noble Drilling Co. would have made some coach a good T-formation quarterback.

P. M. Johns, Jr., isn't the type to carry the ball very often, but he leaves the impression he always knows where it is and just what men in his closely knit organization are best suited to carry it under any given set of circumstances.

Quiet and soft-spoken, Johns doesn't make noises like the president of a drilling company. He acts very much as if he doesn't regard himself as the "boss" at all, but as only one cog in a smoothly operating machine.

He was named president last month when C. C. Forbes became chairman of the board, a post that had been vacant since the death in 1950 of Lloyd Noble, founder of the company. The new president doesn't look on his elevation to the new job as any element of a personal success story.

"It's simply a matter of having been chosen to coordinate the efforts and work of a bunch of successful people," he commented after several sober moments of reflection. He looks at his company as a well-integrated team that functions smoothly "24 hours a day" every day because every member of the team is "doing his job and doing it well."

"We're a comparatively young company and we like to think we've done well," he commented. "If we have, it has been because of that teamwork. We think it's important."

It must be important. In less than 25 years Noble Drilling Co. has developed from a small company to one that has operated over most of the nation's oil-bearing lands. Noble has drilled as far east as North Carolina and Maryland, throughout the entire Rocky Mountain region, over all the Mid-Continent area, and extensively in the Gulf Coast, where it has specialized in marine operations with submersible barges.

In addition to the Tulsa headquarters, Noble Drilling maintains offices in Oklahoma City, Fort Worth, Midland, New Orleans, and Casper, Wyo.

Like the founder of his company, Johns grew up in Ardmore, Okla., where he finished high school. After attending the University of Oklahoma, he was working in American Bank & Trust Co. when Noble founded the drilling company in 1930. Three years later, Johns left the banking business to launch himself in the oil industry "because I thought it was an opportunity to be associated with men like Noble and Forbes."

He joined the firm in the accounting and administrative department and moved to the Tulsa office a short time afterward. In the 20 years he has spent with the company, Johns moved upward through the posts of assistant secretary and treasurer. In 1948, he was named vice president and treasurer and held that post until he took over the reins of the company's activities in October.

W. S. Moses has resigned as production engineer for Barnett Serio Drilling Co. at Natchez, Miss., to become chief engineer for Justiss-Mears Oil Co., Inc., at Jena, La.

A. P. Tiddens, formerly district geologist for Seaboard Oil Co. of Delaware, has joined the oil and gas division of DeKalb Agricultural Association, Inc., as general manager of its new northern oil division. He will remain in Billings, Mont.

Lorin A. McElwee has been promoted by United Gas Corp. from district measurement superintendent at Beaumont, Tex., to section supervisor in the company's general office research department at Shreveport. He joined United Gas in 1932 at Jackson, Miss., and was promoted to instrument man at Bogalusa, La., in 1937. He was made district measurement superintendent in 1942 at Jackson and a year later was transferred to Beaumont.

Elwyn E. Winne, who joined Grace Chemical Co. in 1948 as a chemical engineer, has been elected a vice president and director of the company. Other new directors are **William R. Thurston,** president of Thurston Chemi- and Naco Fertilizer Co., and **John T. Whitely,** an assistant vice president of W. R. Grace & Co., the parent organization.

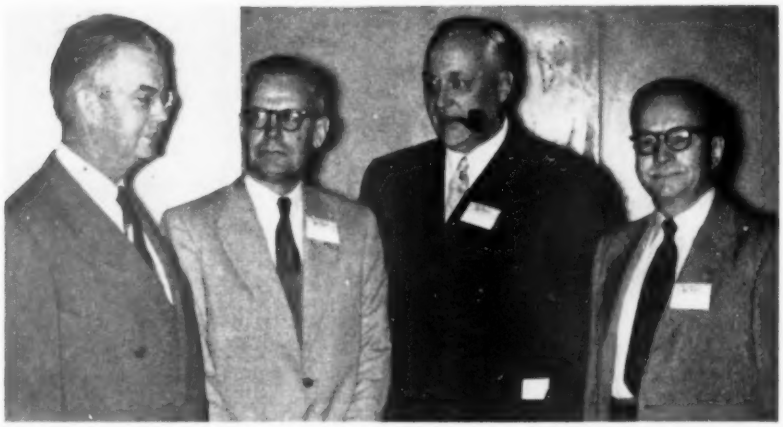
George August, principal reservoir engineer for the Long Beach Harbor department's petroleum division, has resigned to join Arabian American Oil Co. as a petroleum engineer. He was scheduled to depart from New York for Dhahran, Saudi Arabia, the latter part of October.

Fred E. Rugg, formerly development engineer at Tulsa, has been made district petroleum engineer at Oklahoma City by Dowell Incorporated. He served as junior service engineer for Dowell at Kermit and McCamey, Tex., and previously was with El Paso Natural Gas Co. and Sinclair Oil & Gas Co.

C. C. (Mike) Harter has been elected vice president of Oil & Gas Property Management, Inc., Dallas. Prior to joining Property Management, he was associated with Continental Oil Co., DeGolyer & MacNaughton, and San Juan Oil Co. The firm was organized in 1952 to purchase or manage oil and gas properties and to engage in general petroleum consultation. It has production in East Texas, Ahahuac, Old Ocean, Southwest Antioch, and various other fields.

Frederic A. Bush, chief geologist for Sinclair Oil Corp. in New York since 1945, has been transferred and reassigned to Sinclair Oil & Gas Co.'s executive headquarters in Tulsa. He has assumed direction of geological and geophysical exploration and exploitation activities in the various states and Canadian provinces in which the company operates. Bush is continuing as a vice president and a member of the board of directors of Sinclair Oil & Gas. He joined Sinclair Oil & Gas in 1926 and was appointed chief geologist in 1930. He continued in that position until being made chief geologist for Sinclair Oil.

PERSONALS



Present A.A.P.G. Head, Candidates Attend G.C.A.G.S. Meet

Among those attending the third annual meeting of the Gulf Coast Association of Geological Societies in Shreveport, October 22-24, were (left to right): John B. Hussey, commissioner of conservation for Louisiana; Karl A. Mygdal, assistant to exploration manager, Pure Oil Co., Chicago, and a candidate for president of the American Association of Petroleum Geologists; John Emery Adams, Standard Oil Co. of Texas, Midland, current A.A.P.G. president; and Clarence L. Moody, research geologist, Ohio Oil Co., Shreveport. Edward A. Koester, consultant, Wichita, not pictured, is also a candidate for A.A.P.G. president.

Guy W. Howell, Jr., has been named assistant manager of crude-oil purchases and sales for Sunray Oil Corp., Tulsa. He has been associated with Sunray's refining and crude-purchasing section since 1946.

Nick van Wingen, consulting engineer in Los Angeles, has been appointed to the engineering faculty of the University of Southern California as a visiting professor. He recently returned from Turkey where he spent several months as an oil consultant for the government at Ankara.

Jim E. Leascher, formerly crude-oil buyer for Stanolind Oil Purchasing Co. at Midland, Tex., has been transferred to Oklahoma City where he will handle crude-oil purchases in southern Oklahoma. He replaces the late Dan L. Mahoney. **Clyde W. Winter,** who has been located in Stanolind's Tulsa office, has been transferred to Midland to take over duties previously handled by Leascher.

James E. Rippy, operating engineer, has resigned his position with Shell Oil Co. at Wood River, Ill., to join National Petro-Chemicals Corp. at Tuscola, Ill.

James B. Smith, formerly executive vice president of Vickers Petroleum Co., Inc., Wichita, has been made a vice president and manager of sales for Sunray Oil Corp. He also was made a member of Sunray's management committee. Smith will direct the company's sales activities for all finished petroleum products from Sunray's refineries at Allen and Duncan, Okla., and natural gasoline and liquefied petroleum products from the firm's various field plants in Oklahoma, Texas, and Arkansas.

Roy Harris has resigned as staff geologist in the regional headquarters of Lion Oil Co. at Midland, Tex., to join Anderson-Prichard Oil Corp. in Midland as division manager and division geologist. He succeeds **Kenneth C. Anderson,** who is being transferred to the Rocky Mountain area after holding those positions for 2½ years. Harris had been with Lion 4 years at Midland and 2 years at the firm's headquarters in El Dorado, Ark.

K. R. Gerhart and **R. L. Kylander** have been appointed to new positions in Continental Oil Co.'s petrochemical department. Gerhart has been promoted from sales service laboratory supervisor at Conoco's Baltimore petrochemical plant to assistant superintendent of the company's petrochemical plant at Chicago. He joined Conoco as a chemist at Baltimore in 1947 and had held his former position since 1952. Kylander has been promoted from process engineer at Ponca City, Okla., to process-sales service engineer at Baltimore. He has been with Conoco since 1947.

Edwin R. Ward has joined The Texas Co. as an engineer trainee at New Iberia, La. He was recently graduated from the University of Oklahoma.

Lewis McGuire has been promoted from assistant superintendent to superintendent of Continental Oil Co.'s East Kansas production district. He will continue to make his headquarters at Geneseo, Kans., and replaces **J. P. Neel,** who has retired. McGuire has been with Conoco since 1936 and was made assistant district superintendent in 1949.

Don R. Gearhart, vice president of Sinclair Oil & Gas Co., has been transferred from Fort Worth to Tulsa. He has been in charge of the company's exploration activities in Texas and southeastern New Mexico, and will now direct all the firm's exploration activities. Gearhart will continue as a vice president and member of the board of directors.

L. W. Moore has been elected first vice president of Pan American Petroleum & Transport Co. He will continue as president of the subsidiary Pan

L. W. MOORE

DR. H. R. SNOW

American Refining Corp. and Mexican Petroleum Corp. of Georgia. After joining Pan American's parent company, Standard Oil Co. (Ind.) at Whiting, Ind., in 1933, he was transferred to Pan American in New York in 1935, where he has been assistant to the president, manager of research, and manager of manufacturing. He was elected president of the refining corporation in 1949. **Dr. Harold R. Snow,** vice president of Pan American Refining and Mexican Petroleum, has been appointed general manager of manufacturing. Presently general manager of Pan American's refinery at Texas City, he will be transferred to New York. **S. B. Schapiro,** formerly general superintendent, replaces Dr. Snow at Texas City. **B. G. Babin,** formerly assistant general superintendent at Texas City, has been appointed plant manager, and **W. S. Peeler,** formerly operating superintendent, has been made general superin-

Call your
BUTLER
Distributor
for bolted tanks...

QUALITY COATED

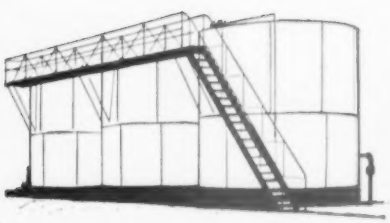
to resist corrosion

AMERICAN PIPE AND SUPPLY COMPANY
Casper, Wyoming · Denver, Colorado · Cut Bank, Montana

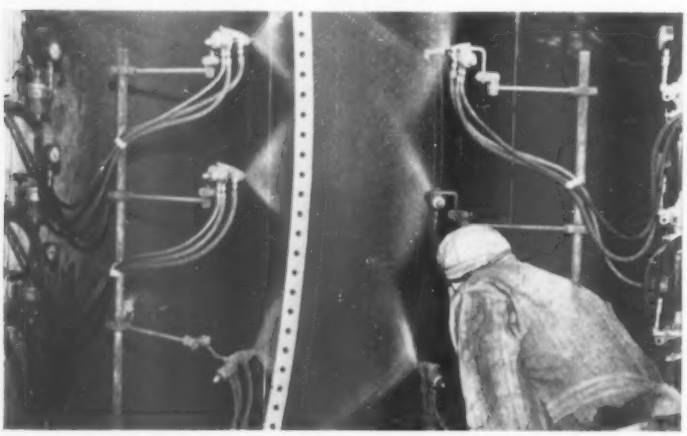
HARRY G. MILLER
El Dorado, Arkansas

UNION TANK AND SUPPLY COMPANY

Fort Worth, Texas
Houston, Texas
Odessa, Texas
Alice, Texas
Snyder, Texas
Tyler, Texas
Midland, Texas
Nocona, Texas
Abilene, Texas
Dallas, Texas
LaFayette, Louisiana
Ruston, Louisiana
New Orleans, Louisiana
Dubach, Louisiana
Glendive, Montana
Wichita, Kansas
Plainville, Kansas
Great Bend, Kansas
Ardmore, Oklahoma
Tulsa, Oklahoma
Oklahoma City, Oklahoma
Hobbs, New Mexico
Denver, Colorado
Sterling, Colorado
Casper, Wyoming
Powell, Wyoming



Butler stairs and walkways are easy to assemble, give years of service. Fit all A.P.I. bolted tanks, may be used in many other ways.



Every sheet in a Butler bolted steel oil tank is completely protected with quality galvanizing or painted coatings. This is your assurance of rust and corrosion resistance that means extra years of low-cost crude oil storage.

Galvanized tanks are hot-dipped after fabrication so that every edge and bolt hole is protected. Painted tanks are coated with primer and sprayed with aluminum paint. Modern electrostatic spray equipment assures complete, uniform coverage. Aluminum decks are available with either painted or galvanized tanks. Sizes range from 100 to 10,000 barrels. A.P.I. specifications are followed on all tanks.

Your Butler distributor's trained, experienced representatives will help you select the right Butler tank for your storage problems. He knows the problems of the oil field in which your wells are located.

Be sure you get long lasting bolted tanks, erected when you want them. Call your nearby Butler Distributor for fast service on quality tanks.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY
7464 East 13th St., Kansas City 26, Missouri

Manufacturers of Oil Equipment · Steel Buildings · Farm Equipment · Cleaners Equipment · Special Products
Factories located at Kansas City, Mo. · Galesburg, Ill. · Richmond, Calif. · Birmingham, Ala. · Minneapolis, Minn.

PERSONALS

tendent. **M. C. Hopkins,** who was technical director of the research and development department at Texas City, has been named plant manager for the new refinery which Pan American plans to build at Yorktown, Va.

W. H. Olrich has been promoted from foreman to superintendent at Scottsville, Ky., by H. C. Price Co.

Dr. Henry Robert Linden has been named associate research director of the Institute of Gas Technology in Chicago. He was associated with Socony-Vacuum Laboratories in Brooklyn before joining the institute in 1947.

R. E. KEPKE

Robert E. Kepke, vice president of British American Oil Co., has been appointed executive vice president of the firm's wholly owned subsidiary, British-American Oil Producing Co., with headquarters in Dallas. He succeeds **C. D. Miller,** who has resigned to enter private business. Kepke will continue as vice president and director of Toronto Pipe Line Co. and as director of Platte Pipe Line Co. He joined British-American Oil Producing in 1942 and was called to Toronto in January 1949 as vice president in charge of the newly created department of supply and transportation.

William B. Kays, Jr., formerly junior petroleum production engineer at Wilmington, Calif., has been transferred by Union Pacific Railroad Co. to Rock Springs, Wyo., as petroleum production engineer.

R. Chester Reed has been elected vice president and **A. Douglas Murphy** a director of the Packaging Institute. Reed is supervisor of packaging and shipping for The Texas Co., and Murphy is coordinator of packaging for Esso Standard Oil Co.

John R. McMillan, president of Fullerton Oil Co., Pasadena, Calif., has been elected chairman of the petroleum branch of the American Institute of Mining and Metallurgical Engineers for 1954. **Thomas C. Frick** of Atlantic Refining Co., Corpus Christi, Tex., and **D. W. Akins, Jr.,** of Ohio Oil Co., Shreveport, have been selected vice chairmen. **Claude R. Hocott** of Humble Oil & Refining Co. was chairman of the petroleum branch in 1953.

Charlie Lee, geologist with Continental Oil Co. in Casper, Wyo., has been transferred to Durango, Colo.

W. M. Capps, formerly field engineer at Tatum, N. M., for Amerada Petroleum Corp., has been transferred to Tulsa as production engineer.

Robert A. Bishop, division geologist for Sohio Petroleum Co. at Billings, Mont., was recently awarded the Medal of Merit of the Alberta Society of Petroleum Geologists for his geological work in western Canada.

Clarence Symes, Jr., Sunray Oil Corp.'s district geologist at Midland, Tex., for about 2 years, has been transferred to Roswell, N. M., to be head of the new district. **Bruce Coltman,** staff geologist at Midland, also has been moved to Roswell. **Joe S. Peerson,** formerly Sunray's district geologist at Lake Charles, La., has replaced Symes at Midland.

Edward S. Martin, Washington, Pa., has been elected president of the Southwest Pennsylvania Producers Association, formed recently by 75 producers representing oil acreage in Allegheny, Beaver, Greene, Washington, Fayette, and Westmoreland counties. **Robert W. Freese,** Westview, has been named vice president, and **J. L. Dunn,** Dunns Station, secretary-treasurer. Directors elected to represent the respective counties are: **C. E. Loane** and **Charles E. Young,** Allegheny; **George W. Dawson,** and **Isaac M. Fisher,** Beaver; **W. V. Hoskinson, Kenneth P. Milliken,** and **Paul McNay,** Greene; **Dwight Lacock, C. C. Wharton, Jr.,** and **Paul Stainbrook,** Washington; and **E. W. Beedle, Jr.,** Fayette.

DEATHS

Fred B. Koontz, 64, vice chairman of the board and former president of Mid-Continent Petroleum Corp., died of a heart attack in a Tulsa hospital October 29. Koontz, widely known refinery technologist, became vice chairman in 1949 after serving 3 years as president. Before that he had been vice president in charge of manufacturing. Koontz entered the oil industry in 1907 as a chemist for Waters-Pierce Oil Co. in Tampico, Mexico, 5 years later joined Standard Oil Co. of California, and in 1917 became process superintendent with Cosden Oil Co., which built what is now the Mid-Continent refinery in Tulsa. He became refinery superintendent in 1922 and vice president in 1928.

E. Fay Goble, 81, pioneer oil man in Kern County, California, died recently in Bakersfield. He was active in the exploration in that area from 1901 until his retirement in 1925 and was connected with development of the McKittrick and Maricopa fields.

Bernard (Ben) Johnson, 65, died of a heart attack recently at Ventura, Calif. He had retired the day before his death as drilling foreman for Tide Water Associated Oil Co. Johnson joined the firm in 1922 and had been at Ventura since 1930.

Robert A. Goodall, 62, independent operator, died recently in Ogallala, Neb. He was active in oil production and exploration throughout the Rocky Mountains, with holdings in the Glenrock area of Wyoming and in the Denver-Julesburg basin. One of his firms, Goodall Pipe Line Co., is participating with Sinclair Pipe Line Co. in the laying of a line to move crude from fields in the Little Beaver area of Colorado to Merino, Colo. He also was planning to construct a gathering system and a natural-gasoline plant in the Little Beaver area.

Raymond O. Wingett, 44, geologist and geophysicist for the Gulf division of Union Oil Co. of California, died recently in Houston of a heart attack. Prior to joining Union in 1946, he had worked as a geophysicist with Cities Service Oil Co. and Gulf Research & Development Co. in Pittsburgh and Houston.

Dale D. Greenwell, 56, supervisor of mechanical equipment for Great Lakes Pipe Line Co., Kansas City, died of a heart attack recently while on a vacation trip to Cassville, Mo. He was associated with Marland Oil Co. and Continental Oil Co. before joining Great Lakes when it was formed in 1930.

John Johnston McNicol, 67, died recently in Tulsa following a heart attack. He retired January 1 as an operator in the heavy oils department at Mid-Continent Petroleum Corp.'s West Tulsa refinery after 33 years with Mid-Continent and its predecessor, Cosden Oil Co.

SYMPOSIUM . . . Use of Wire-Mesh Sections in

Asphalt Entrainment Control in Vacuum Pipe Stills

Part 1

Why This Symposium?

by George Weber
Refining Editor

PROGRESSIVE refiners are continually seeking ways and means to improve product realization from the crudes they run to stills. Since the war, billions of dollars have been spent in modern processing facilities to raise the yield and quality of the higher-valued distillate fractions of petroleum.

Sometimes alertness to new ideas for modifying conventional operations can provide the refiner with the means of improving product realization with existing equipment—at a fraction of the cost of added processing units. A case in point is the adaptation of knitted wire-mesh sections in vacuum units to eliminate entrained asphalt from distillate streams.

At the request of process engineers in the industry, The Oil and Gas Journal invited a cross-section of refiners to tell of their experiences in using this new technique. Their excellent response typifies two characteristics of this industry; a progressive outlook fostering experimentation and research in the field, and a willingness to share findings with the industry as a whole.

The result is this symposium on this very timely subject. It comprises a collection of case histories which begin in this issue. They tell of varying results from different applications and frankly reveal both right and wrong methods tried. This particular technique is fairly new and no published information has appeared heretofore on the level of practical application. Hence this symposium represents a progress report. Few contributors feel they have the final answer on all the angles.

What is wire mesh? . . . Briefly, the mesh sections consist of layers of fine knitted wire of a metal alloy suitable to stand up under the operating conditions imposed. They are called variously, demister pads, mist eliminators, mesh blankets, etc.

Knitted wire, as differentiated to woven wire, shows an extremely high free volume and has superior properties for removing liquids entrained in vapors. When properly corrugated and built up in layers of 4 to 6-in. thickness, a knitted wire section of about 97.5 to 98 per cent free volume results.

When vapors containing finely divided liquid mist are passed through these mesh sections, over 99 per cent of the entrained liquid droplets impinge on the wire, coalesce into large drops, and drain free from the mesh section. Knitted wire-mesh sections thus have numerous applications in oil and gas production, field processing, pipe lining, and refining.

This symposium concerns an important use in preventing the entrainment of heavy asphalt with vacuum vapors, and the contamination of vacuum distillate streams. The result: cleaner cat feed stocks, lube stocks, and other product streams. The substantial lowering of carbon residue and metal contamination in cat feed can result in marked improvement in catalytic cracking capacity and catalyst activity.

In general a few points on technique are in order. The mesh sections must be supported on knife-edged members. Simply laying the mesh blanket on a perforated tray, or a substructure of bars or beams will result in rapid clogging. A straight-line upward flow of vapor through the mesh is desirable, and proper spacing in the tower is important. Certain precautions must be observed in bringing the unit down.

These points and many others are covered in the case histories which follow.

...Case History—Sinclair Refining Co., Sinclair, Wyo.

by J. S. Corlew

A STAINLESS-STEEL wire-mesh section was installed in the asphalt vacuum still of the Sinclair, Wyo., refinery of Sinclair Refining Co. in an attempt to prevent entrainment of asphalt in the gas-oil overhead when the still was being run at increased rates.

Operating Conditions

The vacuum tower is an 8-ft. 6-in. diameter vessel with internal heat exchangers and gas-oil cooler as shown in Fig. 1. Feed to the tower enters tangentially while asphalt is drawn directly off the bottom and gas-oil overhead is drawn from the side of the tower after passing through the internal exchangers and cooler.

Internals modification . . . The tower originally had three splash trays and two bubble trays above the feed entry and four bubble trays below the feed entry. Modification of these internals to the final arrangement shown in Fig. 1, before wire-mesh installation, resulted in improved operation of the still. These changes consisted of (1) removing the four bubble trays in the stripping section which were of little value since it was found that steam could not be used for stripping because of emulsion difficulties, (2) removing the three splash trays, (3) increasing the spacing between the tower inlet and the first bubble tray, and (4) increasing

the spacing between the bubble trays.

Typical operation of the tower before installation of the wire-mesh section is shown in Columns A and B, Table 1, for feed rates of 2,750 and 3,200 bbl. per day. When producing 100-penetration asphalt, feed rates lower than 3,200 bbl. per day generally resulted in cleaner overhead with a lower carbon residue while feed rates in excess of 3,200 bbl. per day resulted in a black overhead having a carbon residue of 0.5 per cent or above.

Although the feed to the tower contains from 1.7 to 2.0 per cent sulfur, corrosion is not severe. The tower is carbon steel with cast-iron bubble trays and carbon-steel heat exchangers.

A single wire-mesh section consisting of a 4-in. thick woven mat of Type 304 stainless steel wire was installed below the top bubble tray. The mat covered the entire cross-sectional area of the tower with the exception of the downcomer from the top bubble tray.

Mat support . . . The mat was supported by means of ⅜-in.-diameter stainless-steel rods spaced on 6-in. centers which in turn were supported by a bar grating of ½ by 2½-in. flat bar stock on edge as shown in Fig. 2. The wire mesh was cut in sections that would pass through the tower manway and were laid diagonally to the rod supports. Sections were then sewed together with stainless-steel wire and stainless-steel ½-in. "Band-it" strap was laid on top of the mat and wired to the ⅜-in.-diameter stainless-steel support rods in order to hold the mat in place.

TABLE 1—OPERATION OF ASPHALT VACUUM TOWER BEFORE AND AFTER INSTALLATION OF WIRE-MESH SECTION

	Before installation		After installation				
Column—	A	B	C	D	E	F	G
Charge stock—							
Rate, bbl. per day	2,750	3,200	2,750	3,200	3,500	4,200	4,500
Gravity, A.P.I.	20.4	20.7	20.4	20.5	20.1	20.4	20.4
Gas-oil overhead—							
Rate, bbl. per day	2,126	2,573	2,150	2,458	2,755	3,322	3,542
Per cent on charge	77.3	80.4	78.2	76.8	78.7	79.1	78.7
Gravity, °A.P.I.	25.0	24.9	24.6	24.6	24.6	24.6	24.6
Carbon residue, wt. %	0.26	0.30	0.14	0.25	0.20	0.29	0.29
Color N.P.A., dilute	5	7	2	2	2	2	Black
Asphalt bottoms—							
Rate, bbl. per day	624	627	600	742	745	878	959
Per cent on charge	22.7	19.6	21.8	23.2	21.3	20.9	21.3
Penetration	167	110	128	92	134	102	129
Operation conditions—							
Reflux, bbl. per day	72	70	30	28	28	28	28
Flash temperature, °F.	690	700	690	690	690	695	695
Abs. press. at flash section, mm. Hg.	38	35	26	24	27	31	28
Pressure drop between flash section and top of tower, mm. Hg.	2	2	3	4	4	4	4
Vapor velocity, ft. per sec.	7.7	10.2	11.3	14.0	13.9	14.7	17.1

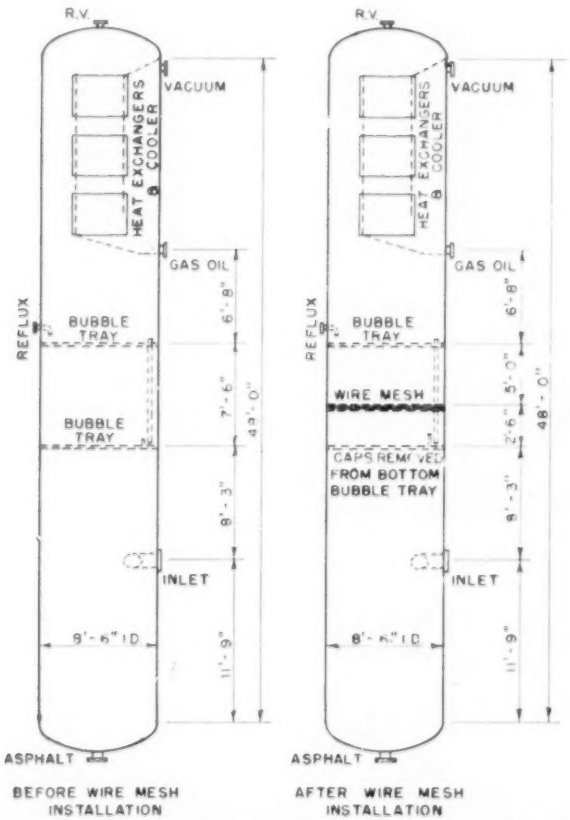


Fig. 1—Asphalt vacuum still of Sinclair Refining Co. at Sinclair, Wyo.

The method of installing a replacement mat differed slightly from the original installation and consisted of placing ⅜-in. diameter stainless-steel rods spaced on 6-in. centers on top of the mat. The rods were welded to the shell of the tower and thus held the wire-mesh section in place without the use of the Band-it strap wired to the support rods. It is felt that both methods of installation are satisfactory from an operating standpoint with the latter method somewhat easier to install.

As shown in Fig. 1, the wire-mesh section was installed 5 ft. below the top bubble tray and an angle support ring for one of the original tower splash tray locations was utilized in installing the section. The wire mesh is operated without reflux since the downcomer from the top bubble tray passes through the wire-mesh section and is sealed on the lower bubble tray. The downcomer seal was increased to about 9 in. (weir height 12 in.) in order to prevent bypassing of vapors in the event the wire mesh should become partially plugged with coke. Bubble caps were removed from the bottom tray because of the possibility of this tray coking easily with entrained asphalt removed by the wire-mesh section. The tray was left in place as a vapor distributor below the wire mesh.

Operating data after installation of the wire-mesh section for feed rates of 2,750 to 4,500 bbl. per day are presented in Columns C to G inclusive in Table I. A comparison of operation at a feed rate of 2,750 bbl. per day indicates a 46 per cent reduction in carbon residue in the gas-oil overhead while operation at 3,200 bbl. per day shows a 17 per cent reduction. Previous to installing the wire mesh, feed rates above 3,200 bbl. per day were

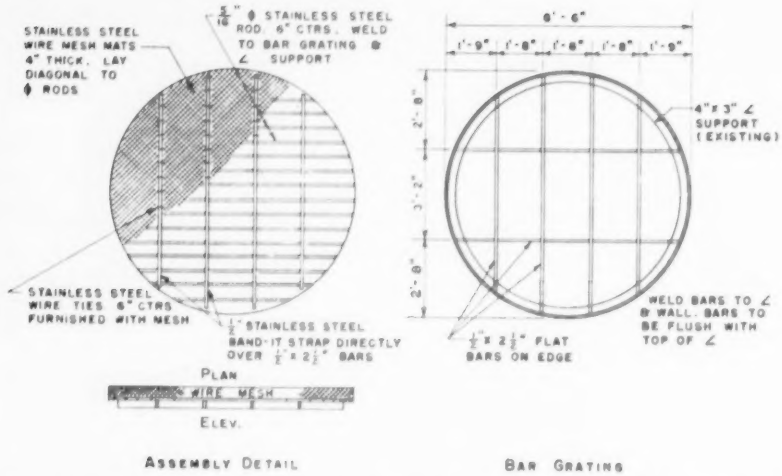

STAINLESS STEEL WIRE MESH MATS 4" THICK, LAY DIAGONAL TO ϕ RODS
5/16" ϕ STAINLESS STEEL ROD, 6" CTRS., WELD TO BAR GRATING @ ∠ SUPPORT
STAINLESS STEEL WIRE TIES 6" CTRS. FURNISHED WITH MESH
½" STAINLESS STEEL BAND-IT STRAP DIRECTLY OVER ½" x 2½" BARS
PLAN
WIRE MESH
ELEV.
ASSEMBLY DETAIL
6'-6"
1'-9"
1'-8"
1'-8"
1'-8"
1'-9"
2'-8"
3'-2"
2'-8"
4" x 3" ∠ SUPPORT (EXISTING)
WELD BARS TO ∠ & WALL. BARS TO BE FLUSH WITH TOP OF ∠
½" x 2½" FLAT BARS ON EDGE
BAR GRATING

Fig. 2—How wire-mesh section was installed in asphalt vacuum still at Sinclair, Wyo., refinery.

prohibitive because of the black color and high Conradson carbon of the overhead produced, whereas installation of the wire mesh has permitted an increased feed rate of 4,200 bbl. per day while producing 100-penetration asphalt and obtaining a 0.30 per cent carbon residue on the gas-oil overhead. Allowable tower vapor velocities without severe entrainment increased from about 10 ft. per second at 3,200 bbl. per day feed to about 15 ft. per second at 4,200-bbl. per day feed.

Operation with the wire-mesh section produced a clean gas oil with an N.P.A. dilute color of 2 until the point of severe entrainment was reached at a feed rate of 4,500 bbl. per day while making 100-penetration asphalt. At this point the gas-oil overhead went black and had a carbon residue of 0.53 per cent. Vapor velocity under these conditions was about 17 ft. per second.

Replacement . . . The first wire-mesh section installation was replaced after 981 days of operation. Replacement was due to coke buildup on the wire-mesh section which increased the pressure drop across the section to about 7 mm. Hg at a feed rate of about 3,200 bbl. per day and decreased the capacity of the tower. During a turnaround the wire-mesh section is wetted with water as a precautionary measure, and burnout of the wire-mesh section has not been encountered. Although past experience indicates a good service record for the wire mesh, it is the policy to maintain a spare on hand at all times for emergency replacement.

Conclusions . . . Installation of the stainless-steel wire-mesh section in the asphalt vacuum still at Sinclair, Wyo., has proved to be of real value. Advantage has been taken of the increased capacity of the tower while producing equivalent or better quality of gas oil and asphalt than produced at lower feed rates before the installation of the wire mesh. The life of a wire-mesh section under normal operating conditions appears to be between 2 and 3 years.

. . . Case History—Cosden Petroleum Corp.

by Allen R. Orr

COSDEN PETROLEUM CORP.'S vacuum pipe still at Big Spring, Tex., was placed in operation during the first quarter of 1949. This unit was in service without the wire-mesh section until August 1949. In order to reduce entrainment in the tower, thereby reducing the carbon content (as determined by the Conradson carbon test) of the vacuum gas oil which is charging stock for the fluid cat cracker, a wire-mesh section was added to the vacuum-tower flash zone.

Vacuum-Tower Operation

1. The vessel consists of two sections: the upper section 15 ft. i.d. by 40 ft., the lower-section 5 ft. i.d. by 12 ft.

2. See Fig. 3, for location of internals and charge and withdrawal lines.

3. Charge rates to the tower have varied from approximately 6,500 to 9,000 bbl. daily. Reflux rates have varied from 6,500 to 9,800 bbl. per day. At present, the charge rate is approximately 9,000 bbl. daily with a reflux rate of 9,750 bbl. per day.

4. The charge to the tower consists of topped crude (20° to 21° A.P.I.) from a mixture of West Texas sour crudes (Howard-Glasscock, and Iatan-East Howard) containing approximately 1.5 weight per cent sulfur.

5. Corrosive conditions, as a result of sulfur content of the charge and temperatures of 680° to 750° F. in the lower section of the tower, have resulted in the use of stainless-steel internals in the lower sections. The carbon-steel rings used to hold the mesh section in place have shown considerable corrosion while the stainless-steel material has shown little.

The mesh installed is of 18-8 Type 304 stainless steel 4 in. thick (two layers, each 2 in. thick) supplied by Otto H. York Co., Inc. One such mesh section is installed in the tower and located in the flash zone below the chimney tray.

Supports . . . The mesh section is supported on beams made of 6-in. stainless-steel channel spaced on 2-ft. centers. Atop the beams are ¼ by ½-in. stainless-steel strap-iron strips placed edgewise and spaced on 12-in. centers. A ⅜ by 3-in. carbon-steel ring is placed

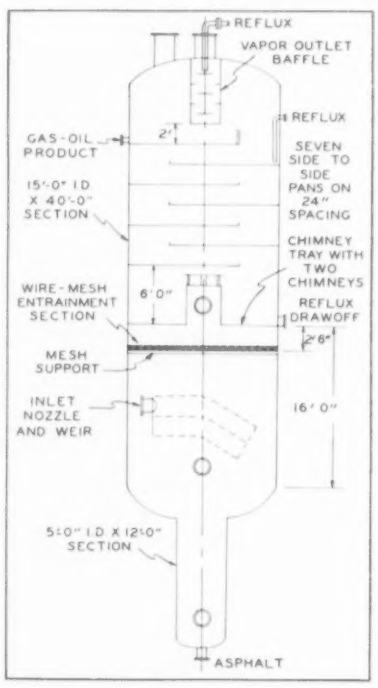


Fig. 3—Construction of vacuum tower and installation of wire mesh at Cosden Petroleum Corp.'s Big Spring, Tex., refinery.

on the strap iron and tack welded to the tower. A second ring ¼ by 3 in. is placed on top of the mesh section and also tack welded to the tower to keep the edges of the mesh section from curling.

The mesh is installed in sections 2 in. thick and cut narrow enough to pass through the vessel manways. The first layer is placed at 90° to the strap-iron strips and the second layer of 2-in. thickness is rotated 90° from the first so as to form a criss-cross pattern between the two layers. This reduces possibility of channeling between the strips of the mesh section.

Stainless-steel rods ¼ in. in diameter, pointed and threaded, are welded to the beams so that when the mesh section is in place the rods protrude through the mesh. The mesh is held in place by washers and nuts fastened to the rods and by stainless-steel wire passed through the mesh and around the beams.

Mesh location . . . The mesh section is located approximately 30 in. below the chimney tray in the flash zone of the column. There are no trays in the column below the mesh section, and trays above the chimney tray are side-to-side perforated pans.

Tower Changes

1. Four side-to-side pans in the 5-ft. i.d. section of the column were removed.

2. A vapor outlet baffle of the "disk and doughnut" type was installed in the top section of the column with provision made for refluxing the vapor outlet baffle.

3. A booster jet was added to the vacuum system in December 1951 to aid in reducing the absolute pressure in the column.

Operation—With and Without Mesh

Capacity . . . Column capacity was not affected appreciably by installation of the mesh section.

Heater temperature . . . Pressure drop through the mesh section made necessary an increase in heater outlet temperatures from approximately 740° to 750° F. when producing penetration asphalts. Asphalt quality is affected little so long as heater outlet temperature does not exceed 760° F. Normal operating pressure of the vacuum unit is maintained at from 10 to 20 mm. of mercury absolute at the top of the tower.

Pressure drop . . . The drop through the mesh section varies from a low of approximately 0.3 in. of mercury to a high of approximately 1.5 in. of mercury because of carbon buildup in the mesh section. When a pressure drop reaches approximately 1.5 in. of mercury, cleanout of the unit becomes necessary due to high carbon content of the gas oil (as determined by the Conradson carbon test) and ductility of the asphalt being adversely affected.

TABLE 2—ASPHALT INSPECTIONS

	Before mesh installed	After mesh installed
Melting point, °F.	94 to 97	93 to 98
Penetration at 77° F.	77 to 86	79 to 86
Ductility at 77° F.	140 to 150+	110 to 150+

Carbon content . . . Inspections of streams from the unit indicate that Conradson carbon values of the gas oil have been improved. Typical values are approximately 0.60 per cent before installation of the mesh section and 0.30 per cent and lower since installation of the mesh section. Typical results of asphalt inspections are tabulated in Table 2.

Steamout . . . Before installation of the mesh section, the tower was normally cooled for entry using air. Water was used during the first shutdown after installation of the mesh. Since then, exhaust steam has been used to steam out the tower before the admission of air. This latter procedure has been found to be very satisfactory, both from a safety standpoint and cleanliness around the tower.

Plugging . . . Inspections during turnaround indicate little or no corrosion in the stainless-steel areas, but rapid corrosion of the carbon-steel rings which support and hold down the mesh section. Each inspection of the mesh section has indicated extensive plugging with carbon. Due to channeling between the sections of the original mesh installation which consisted of one 4-in. thickness, the replacements have been made up of mesh sections 2 in. thick as described previously. Since plugging has been more rapid in the bottom layer of the mesh section, it is sometimes necessary to replace only the bottom layer of the mesh section.

The policy here has been to keep one complete mesh section available for replacement purposes. Orders for new material are placed immediately upon use of the available spares.

Results and Conclusions

1. Asphalt quality is easily maintained until plugging of the mesh section becomes sufficient to cause a pressure drop greater than 1 in. of mercury across the mesh section. As the pressure drop increases, meeting penetration and ductility requirements for the asphalt becomes more difficult. Cleanout of the unit becomes necessary when this occurs.

2. The cat-cracker capacity is rated at 9,000 bbl. per day of fresh feed. Conversion averages approximately 61 per cent based on volume of gas-oil disappearance. Catalyst activity is maintained at approximately 30 weight per cent as compared to new catalyst of 100 per cent. Carbon laydown rates approximate 6,000 lb. per hour. With an increase in Conradson carbon of the gas oil the carbon laydown rate increases to the point of upsetting balances around the unit. Therefore, control of the Conradson carbon is important to efficient cat cracker operation.

3. Observation of the vacuum-tower operations since installation of the mesh section indicates that satisfactory results are obtainable through careful operation. The cleaner gas oil makes the use of the mesh section economically justifiable. However, as mentioned previously, asphalt quality suffers as plugging of the mesh section increases. Turnarounds, to date, have been necessary about twice a year with the primary cause being lower-quality products as plugging increases in the mesh section.

4. Since plugging of the mesh section is an important factor in efficiencies of operation of the vacuum unit, studies have been made to determine means of reducing plugging of the section. Refluxing of the mesh section has been indicated as the best method available for reducing plugging in the section. As a result of the findings of the studies, the vacuum unit is to be revamped as soon as the necessary equipment is on hand. Reflux to the mesh section will be provided.

Results at Big Spring . . .

- Cat cracker conversion averages 61 per cent based on volume of gas-oil disappearance.
- Two vacuum-tower turnarounds annually, as plugging lowers product quality.
- Refluxing of mesh section appears best method for reducing plugging.

. . . Case History—Sinclair Refining Co., Marcus Hook, Pa.

by H. S. Fourer

ONE of the important uses of vacuum flash towers has been in the field of feed-stock preparation for catalytic cracking units. At the Marcus Hook, Pa., refinery of Sinclair Refining Co., two vacuum towers are in this service, processing a 17° to 20° A.P.I. reduced crude to 200-300-penetration asphalt bottoms and producing a gas-oil overhead suitable for cracking feed stock.

Vacuum Operation

A schematic sketch of the tower is shown in Fig. 4. Vacuum is controlled by three two-stage ejectors, connected in parallel, and condensation of overhead vapors is accomplished by banks of eight internal exchangers, four of which preheat crude and four of which are water cooled.

Feed is charged to the 21-ft. diameter section in a tangential entry. The flashed vapors then pass through a bubble-cap tray from which the caps and risers have been removed, thence through a wire-mesh entrainment separator and finally through another capless bubble tray to the condensing system. A baffle was placed extending from the dome of the tower, in such a way as to distribute the vapors more evenly over the internal exchangers.

Condensed overhead is collected in a catch pan and withdrawn to an accumulator. A noncondensable disengaging space is provided above the drawoff section and this space is connected to the vacuum ejector system. The asphalt is withdrawn from the bottom of the tower and pumped to storage.

Operating conditions . . . Table 3 shows typical current operating conditions. Charge stock is reduced crude resulting from topping crude through approximately a 650° F. end point heating-oil cut. Conditions are rather corrosive, with feed stocks containing as high as 3.25 per cent sulfur.

Throughput . . . The original design feed rate for the vacuum towers was 12,000 bbl. per stream day. Through several changes in tower internals and additional vacuum equipment it was possible to increase the feed to a maximum of approximately 20,000 bbl. per day. Superficial vapor velocities in the 21-ft.-diameter section were of the order of 5 ft. per second. Ever-increasing crude runs demanded increasing feed rates to the vacuum towers so that eventually some means had to be found to permit feeding 26,000 bbl. per day to each tower and reduction of the feed to penetration-range asphalt, while still maintaining gas-oil-overhead quality. The greatest difficulty was in preventing entrainment of asphaltic particles in the gas-oil vapors, at the high vapor velocities which were required. It was

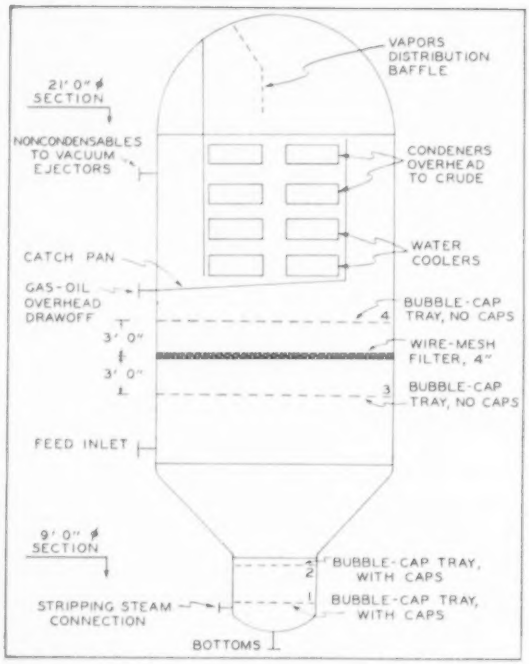


Fig. 4—Vacuum asphalt tower at Marcus Hook, Pa., refinery of Sinclair Refining Co.

TABLE 3—TYPICAL OPERATING CONDITIONS

	B./S.D.	Per cent	°A.P.I.
Flows:			
Reduced crude feed	26,500	100.0	19.0
Gas-oil overhead	18,000	68.0	24.3
Asphalt bottoms	8,500	32.0	9.0
Reflux	None		
Temperature, °F.:			
Feed		750	
Flash section		740	
Top of tower		690	
Gas-oil drawoff		140	
Bottom of tower		735	
Pressures, mm. Hg abs. flash section		40	
Superficial vapor velocity at wire-mesh section, ft./sec.		10.6	
Pressure drop across wire-mesh, mm. water		35	

TABLE 4—COMPARISON OF OPERATIONS BEFORE AND AFTER DIMESTER PAD INSTALLATION

Type of Feed: Reduced crude (Middle East crude)

	Before installation	Per cent	After installation	Per cent
Feed	20,000	100.0	26,500	100.0
Gas-oil overhead	13,800	69.0	18,000	68.0
Asphalt bottoms	6,200	31.0	8,500	32.0
Flash zone temperature, °F.	747		740	
Flash zone pressure, mm. Hg abs.	70		40	
Superficial vapor velocity, F.P.S.	4.5		10.6	
Product inspection:				
Feed, °A.P.I.	20.0		19.0	
Overhead, °A.P.I.	24.9		24.3	
A.S.T.M. distillation, °F.:				
I.b.p.	530		544	
10	640		620	
50	730		688	
80	760		712	
Carbon residue, weight per cent	0.51		0.38	
Bottoms:				
°A.P.I.	9.5		9.0	
Penetration	380+		300	

at this time that the use of a wire-mesh demister pad was suggested.

Description of Mesh Section

The demister pad installed was a product of Otto H. York Co., Inc., and was constructed of Type 304 stainless steel. The installation consisted of two 2-in. thick pads placed at right angles to each other, and wired together for a total thickness of 4 in. Each pad was constructed from strips of suitable length and 13¼-in. width.

The lower section was supported on a grid work constructed of stainless-steel bars and rods which were fastened to each mesh strip by the manufacturer, and this integrated construction then supported on a lattice work of flat bars which had been placed across a former tray support in the tower. To prepare for the demister installation, a complete bubble tray had been removed from the 21-ft. section of the tower, and the supports were utilized for the demister-pad installation, as just described. Fig. 4 shows its position relative to the other internals of the tower. The entire demister installation is held down with a construction similar to the support grid.

The mesh section is operated without reflux.

The prime purpose of the demister installation was to permit higher feed rates to the vacuum towers while still maintaining quality of the gas-oil overhead. In this role, the wire-mesh pads have been very successful. As had been indicated previously, it has enabled a throughput increase from a maximum of 20,000 bbl. per day to approximately 26,000 bbl. daily.

Table 4 shows a comparison of operations on a Middle East reduced crude before and after demister installation. It is apparent that demister installation has permitted a 32 per cent increase in feed rate, with approximately the same percentage overhead yield. Although superficial vapor velocity has more than doubled, gas-oil quality has not depreciated. In fact, the carbon residue has decreased.

Pad life . . . It has been found advantageous to change pads coincident with vacuum-tower turnarounds. The pads in most cases were somewhat coked for from 2 to 3 in. from the top. Pad life has averaged 4,785 hours, or about 200 days.

Conclusions . . . The use of wire-mesh filters for entrainment control in vacuum distillation towers has proved beneficial from the standpoint of increasing feed capacity 30-35 per cent, with the same per cent overhead yield, and maintaining gas-oil quality.

. . . Case History—General Petroleum Corp., Torrance, Calif.

by D. H. Stormont
Journal District Editor

INSTALLATION of a wire-mesh blanket in a vacuum tower which supplies a substantial portion of the charge stock to several of four catalytic cracking units at General Petroleum Corp.'s Torrance refinery has resulted in a substantial reduction in catalyst poisoning.

Metals Entrainment Problem

As is the case with most California crudes, those being processed at Torrance have an unusually high metals content. Before the mist eliminator was installed, excessive amounts, principally vanadium and nickel, were being entrained in the vacuum tower overhead and sidedraw streams. When these gas oils were fed to the Thermofor cat units, presence of the metals resulted in the catalyst's life being materially shortened. This, of course, led to high catalyst circulation rates, excessive attrition, and greater catalyst make up.

Metals content reduction . . . Insofar as the vacuum tower overhead and sidedraw streams are concerned, installation of the blanket caused an approximate 90 per cent reduction in their metals content, as is shown in Table 5. Because a bubble tray was installed at the top of the tower at the same time as the blanket, however, effect of the latter on liquid entrainment cannot be fully evaluated.

Likewise, improvement in product yields of the cat crackers and in catalyst life cannot be closely ascertained. Other streams are charged to the T.C.C. units along with the vacuum-tower top and sidedraw streams. Also operating changes were made in those units at the time the mist eliminator was installed.

At one time before the blanket was installed, however, one entire batch of catalyst had to be changed because of poisoning.

Deposition of metals also was credited as the principal cause of periodic drops in product yields; a reduction of 60 per cent in butanes and butenes and 20 per cent in gasoline yields was experienced on occasions. Accompanying increased rate of carbon buildup on the catalyst particles at the same time made regeneration more difficult.

Tower Operating Conditions

The 17-ft. 8-in. (i.d.) by 36-ft. vacuum tower normally receives the topped crude from one distillation unit but on occasions may take the excess from two other units not charged to a visbreaker. Tower charge rates therefore vary from the normal 35,000 bbl. daily to 40,000 bbl. or more daily.

Temperatures . . . Bottoms from the topping unit bubble tower as charged to the vacuum tower average about 12° gravity, with a viscosity of 1,000 to 1,500 seconds at 122° F. Inlet temperature averages 720° F., the tower bottom about 675°, and the tower-top temperature is maintained at approximately 575° F. A vacuum of about 40 mm. Hg. (abs.) is held on the tower.

Internals . . . A vapor-distributing "doughnut" is installed just above the inlet nozzles, about 8 ft. above the conical bottom. Other internals are a sidedraw accumulating channel, 11½ ft. from bottom, three baffle trays, and a bubble tray 24 ft. from bottom. The

(Continued on page 121)

TABLE 5—BEFORE AND AFTER COMPARISON OF METALS CONTENT

	(P.p.m.) Sidedraw stream			Overhead stream		
	Vanadium	Nickel	Ash	Vanadium	Nickel	Ash
Before blanket installed (11/28/51)	30	28	136	2.0	2.0	18
First blanket in place (1/3/52)	5	3	29	0.04	0.05	4
First blanket damaged (3/7/52)	18	23	122	0.09	0.10	4
Second blanket in place (4/22/52)	3	3	9.6	0.09	0.03	4.3
Second blanket used 1 year (4/23/53)	3.5	3.5	36	0.16	0.17	6.3

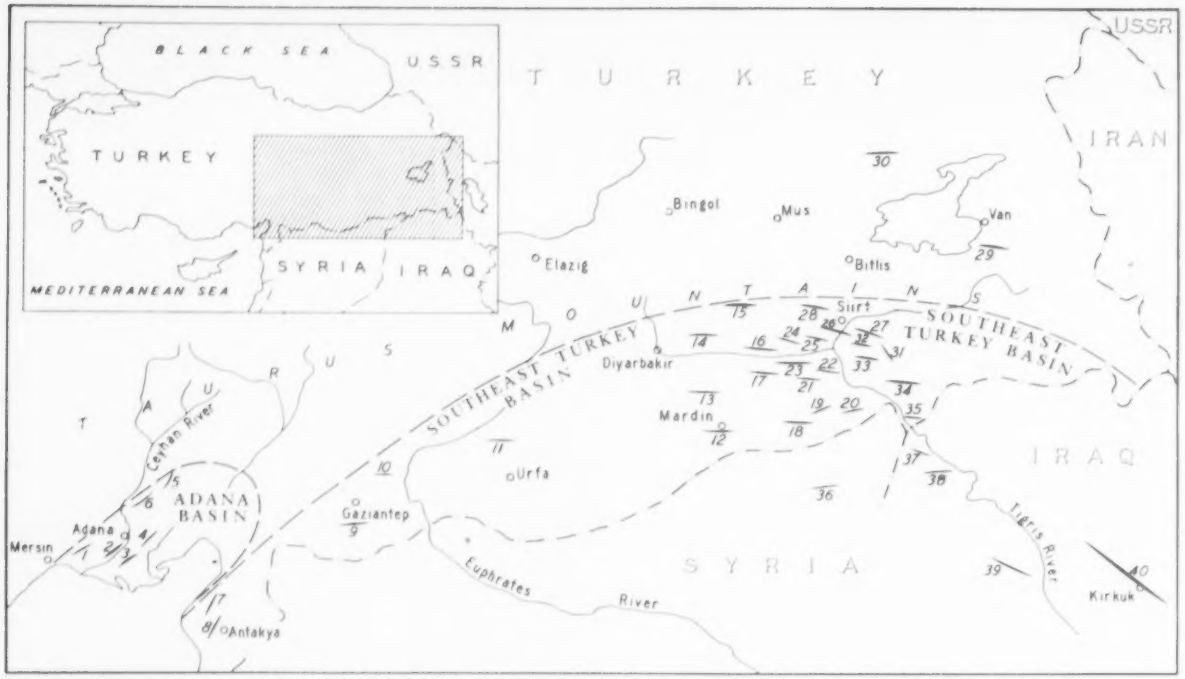


Fig. 1—Some of the structures of southeastern Turkey: (1) Kazanli, (2) Adana, (3) Sazak, (4) Hocali, (5) Agzi Kara, (6) Ihsan Hamit, (7) Cengen, (8) Huseyniye, (9) Sazgin, (10) Karadag, (11) Urfa, (12) Mardin, (13) Hanik, (14) Bismil, (15) Silvan, (16) Raman (17) Gercus, (18) Turabidin, (19) Basbirin, (20) Cebel Ebyat, (21) Hermis, (22) Kerbent, (23) Softek, (24) Garzan, (25) Kentalan, (26) Resan, (27) Sadak, (28) Sirvan-Minar, (29) Edremit, (30) Yakupaga, (31) Birine, (32) Espandika, (33) Bikat, (34) Rohsur, (35) Rubaikale, (36) Sinjar, (37) Moshors, (38) Ainzaleh, (39) Quayyareh, and (40) Babagurgur.

Major Companies Examine Oil Prospects In Southeastern Turkey

. . . where sedimentary section appears especially promising

by Cevat E. Tasman*

TURKEY, the latest entry into the list of the oil-producing countries, is actually one of the oldest from which evidences of natural hydrocarbons have been known.

On the Gulf of Antalya, southwestern Asia Minor, near the village of Chirali, stand the ruins of a historic temple near the ancient city of Olympus. This temple was built 2,500 years ago for the purpose of worshiping a flame of fire that spouts continuously from a cavity near the contact of serpentine and limestone.

On the other side of the country, in northeast Turkey, near the eastern shores of Lake Van, there is record of a bitumen seepage that was auctioned to a contractor, who gathered and dispensed "oil" to the people by paying a tax to the governor some 300 years ago.

Actually evidences of oil and gas are known from more than 50 localities in Turkey ranging in age from the Paleozoic to late Miocene[1]. The application of the drill to find oil in Turkey is comparatively recent, however. The closing years of the nineteenth century saw this kind of activity at Iskenderun, near the Syrian border, and at Mürette, along the shores of Marmara. The results were negligible.

Serious governmental efforts to find oil in Turkey began in 1933. Early workers who made the geologic reconnaissance of the country in association with the writer included M. Lucius, Cunningham Craig, and Frederick Clapp, who have since passed away; Sidney Paige, Louis Vonderschmidt, Harold F. Moses, Howard M. Kirk, John Maxson, Ericson, and Edward J. Foley, who are still applying geology to oil finding.

The southeastern part of Turkey adjacent to Iraq and Syria was the natural sector to concentrate the geologic activity. It was not only geographically next to an area already producing oil but it was in a depositional basin with similar tectonic position in relation to the foreland of the Arabian shield. In this basin the sedimentary section extends from the Paleozoic to the Recent.

Stratigraphy

The oldest sedimentary rocks outcrop in the region of Telbesmi west of Mardin, at a point where the Arabian shield penetrates into Turkey. Here 2,200 m. of fine to coarse-grained,

*Maden Tetkik ve Arama Institute, Ankara, Turkey.

LDB101 NL PD= HOUSTON TEXAS 20 11:37A=
JOHN SMITH BROWN & ROOT, INC.
PITTSBURGH , PA.
JOB 2283 AHEAD OF SCHEDULE.
PLEASE EXPEDITE VESSEL NO. T47.
ADVISE SHIPPING DATE.
DYESS, SUPT.

BROWN & ROOT'S *PLUS* SERVICES COMPLETE PROJECTS FASTER . . . MORE ECONOMICALLY

In every major fabrication center of the United States, BROWN & ROOT maintains highly trained experts in procurement and expediting. They know where materials and equipment are, and how to get them to a BROWN & ROOT project *fast*.

These are only a few of the services that bring BROWN & ROOT customers back again and again. Fully equipped to do a *complete* job—from selecting the proper site for any plant or project on through designing, engineering, and finished construction—BROWN & ROOT specialists "deliver the goods" *on schedule*, ready for immediate operation.

Key men in the top ranks of industrial achievement know the value of these *plus* services. That's why the BROWN & ROOT roster of satisfied clients reads like the Who's Who in Industry.

Why not join their distinguished company if your plans call for expansion or new construction? A BROWN & ROOT representative awaits your call, at no obligation.

BROWN-BILT

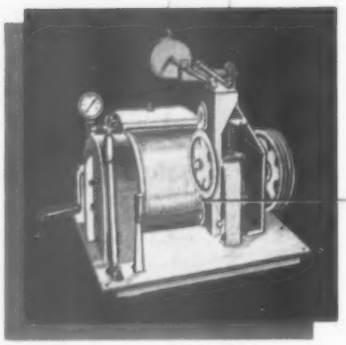
BROWN & ROOT, Inc. *Engineers • Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

DEPENDABLE ACCURACY IS A.P.I. FOR



HALLIBURTON MEASURING DEVICES

Few tools continue to set the standard year after year in the swiftly changing petroleum industry.

Yet Halliburton's famed Measuring Devices fit into this select category. They have been used by oil men to obtain *most accurate* depth measurements over a 25-year span. And dependability is the mark of their continued success.

Progressive engineering by top Halliburton specialists has enabled these precision Measuring Devices to stay ahead of increasing demand. For example, such additions as the latch-type Hay Pulley and special wiper now keep line free of mud cake, permitting more exact measurements in any well, regardless of depth.

These versatile Measuring Devices are regarded as an essential part of drilling equipment for running crooked hole survey instruments, mechanically operated paraffin cutting tools; conducting off shore surveys, running instruments to obtain bottom hole pressures and temperatures, and a variety of other vital downhole jobs.

Dependable accuracy is A.P.I. for Measuring Devices progressively engineered by Halliburton. Use them on your next job – just call your nearby Halliburton representative. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN MEASURING DEVICES!

reddish-gray sandstones with trilobite fragments and micaceous marls underlie the Turonian limestone with an angular unconformity. These sediments were formerly[2] referred to the Cambro-Ordovician but more recently they have been placed in the Cambrian[3].

Devonian and Permo-Carboniferous rocks outcrop at many localities from the Iraq boundary on the east to the Adana basin and beyond on the west.

This section begins with somewhat quartzitic limestones at the base and is composed largely of dark gray limestones with some shale intercalations.

The Triassic-Goyan formation is composed of yellowish bands of marly limestones with a characteristic appearance at distance.

The Jurassic and Cretaceous rocks, up to and including the Turonian, are a comprehensive limestone section.

Oil in commercial quantities is found at Raman and Garzan at the top of this thick limestone and deep tests have shown evidences of bitumen in the lower parts of the limestone section.

The passage from the thick limestone to the Germav shales above is continuous except in the higher parts of the structure where a hiatus is inferred from the absence of the red and green beds immediately above the Mardin limestone in the wells at the high points of the structure.

The Germav shales, with an average thickness of 1,000 m., are Cretaceous in their lower portion and Paleocene in their upper portion. The first appearance of Globutruncana is considered to mark the passage from the Eocene into the Cretaceous.

The Germav is overlain by the Gercush formation, which is characterized by its reddish color. The Gercush is primarily sandy with occasional marl, limestone, and gypsum. There is generally a transitional bed of gray and yellowish marls at the top of Gercush before the deposition of the Midyat limestone.

Midyat limestone with characteristic Eocene nummulites is the cover rock for most of the structures in southeastern Turkey. It is yellowish and marly in its upper portion and is massive and cliff forming in the lower part. It has a thickness between 300 and 400 m. At Tur Abidin Mountain, north of Nusaybin, and at the Kasrik Gorge near Cizre, the Midyat limestone appears to go higher in the geologic column. Near Cebel Ebyat its upper portions contain forms younger than Eocene, even younger than the Oligocene.

The Miocene in southeastern Turkey is largely lacustrine. Near the Iraq boundary it is composed principally of continental deposits. Farther north near Siirt and Garzan, gypsum and

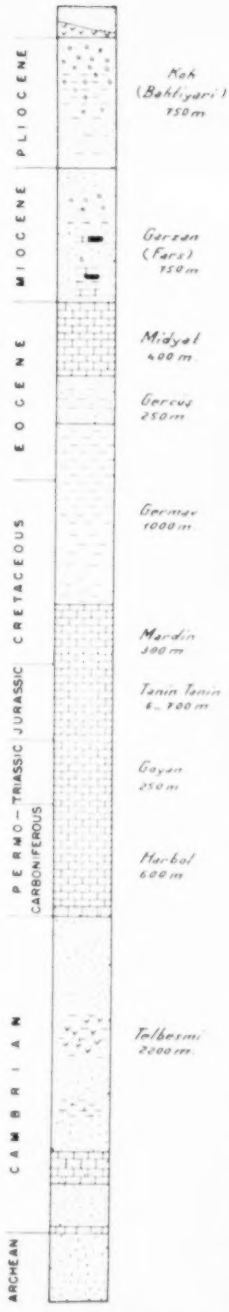
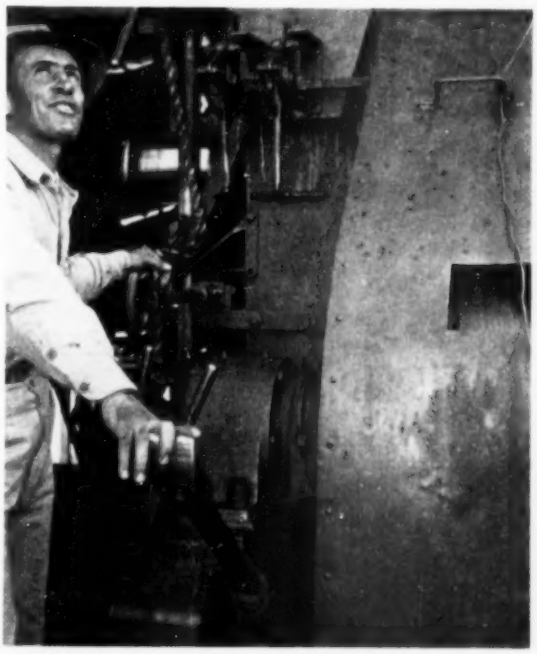


Fig. 2—Stratigraphic column of southeastern Turkey.

DISCOVERY WELL of Garzan, Turkey's second commercial oil-producing field.



EXPLORATORY DRILLING plays an important part in the development of Turkey's oil prospects.

gypsiferous limestones predominate. North of Diyarbakir at Osmaniye, varicolored marls and sandstones represent the section. To the west at Urfa it is a light yellowish color, chalky in character, and contains an abundance of operculinas.

The Miocene is overlain by a thick section of sandstones, shales, and conglomerates increasing in thickness from 800 m. near Siirt to several thousand meters near the Irak boundary. It is a counterpart of the Bakhtiari series in that country.

Structural setting . . . The basin in which the oil forming sediments of southeastern Turkey are deposited lies between the Arabian shield and the Taurus ranges to the north. This belt extends from southern Arabia, around

(Continued on page 122)

OPERATING THE CAT CRACKER—1

What Has Been Happening in CATALYTIC CRACKING?

- Cat cracking capacity in the United States now approaches 3,000,000 bbl. per day, or approximately one-third of crude run.
- Latest Journal refinery survey shows that some 130 refineries out of a total of 323, have cat cracking facilities.
- Earlier mechanical difficulties encountered in cat cracker operation led operators to ask, "how can we keep our cat cracker running? . . ."
- Today purely mechanical difficulties have been largely overcome and emphasis has correspondingly shifted toward obtaining optimum performance. The question increasingly asked today by all cat cracker operators is, "how can we get more out of our cat cracker? . . ." A better understanding of how the cat cracker functions is certainly in order.

by Joseph W. Moorman

TODAY, the heart of any modern refinery is represented by catalytic processes—catalytic cracking, catalytic reforming, alkylation, and catalytic polymerization. This trend towards the use of catalytic processing facilities in refining operations has been brought about by the demand for high-octane motor gasolines.

In this country, oil-refining economics are based upon gasoline and distillate-fuel production with quality as a prime factor. While within the past 2 or 3 years, catalytic reforming of straightrun gasolines has become of importance in gaining octanes, cat cracking still remains the dominant catalytic process in refining. In 1951 the catalytic reforming capacity was only in the order of 94,000 bbl. per day but it is estimated that by 1954 the capacity will be 430,000 bbl. per day. However, this still represents a relatively small percentage of crude capacity. Also, the economics of the installation of catalytic polymerization and alkylation are generally based upon the availability of catalytic cracking facilities.

1—CAT CRACKING CAPACITY

The development of the present modern continuous catalytic cracking processes was accelerated by this country's entrance into World War II and the subsequent demand for high-octane aviation gasoline. Prior to 1941 the total production of aviation gasoline was in the order of 40,000 bbl. per day, but by the end of World War II the production was well over 600,000 bbl. per day. Without catalytic cracking it would probably have been impossible to reach this figure.

Capacity increase . . . The rapid increase in catalytic cracking capacities throughout the United States is indicated in Table I. Prior to 1941 the total catalytic cracking capacity in the country was in the order of 122,000 bbl. per day, representing approximately 5.6 per cent on crude run. In 1946 this capacity had jumped to over 1,000,000 bbl. per day, representing 19.7 per cent of the total crude run. In 1951 the catalytic cracking capacity reached 26.7 per cent of crude run, and in March 1953 the capacity was 34 per cent of crude run.

It will be noted that in 1940 the thermal operations represented a capacity of 94.4 per cent on crude and in 1946, 57 per cent on crude, whereas in 1953 this capacity represented approximately 31 per cent based on crude.

TABLE I—CATALYTIC CRACKING CAPACITY IN THE UNITED STATES

Year	Crude, B.P.S.D.	Catalytic cracking, B.P.S.D.	Per cent on crude	Thermal cracking, B.P.S.D.	Per cent on crude
1940	2,191,600	122,000	5.6	2,070,000	94.4
1946	5,297,055	1,043,000	19.7	3,035,770	57.2
1951	7,032,340	1,873,735	26.7	2,334,630	33.2
1952	7,312,385	2,135,540	29.2	2,236,310	30.5
1953	8,090,283	2,744,204	34.0	2,552,525	31.5

Note that the capacity of thermal operations has remained essentially constant while crude capacity has increased in the order of 2 to 3 million barrels per day which approximates the total catalytic cracking capacity that has been installed. It is estimated that by the end of 1953 the catalytic cracking capacity will be in the order of 3 million barrels per day in the United States. World wide, the total

About the series and the author . . .

This first article, the introduction to a new Journal series, covers in a general way the catalytic cracking processes and the development of the T.C.C. process. The second article, to appear in the November 9 issue, will introduce the major factors involved in fluidized operation. Subsequent articles, appearing from time to time, will deal more specifically with operational factors such as feed stocks, catalysts, effect of particle size, catalyst recovery, reaction and regeneration, heat and material balance and relation of operating variables for both the F.C.C. and T.C.C. processes.

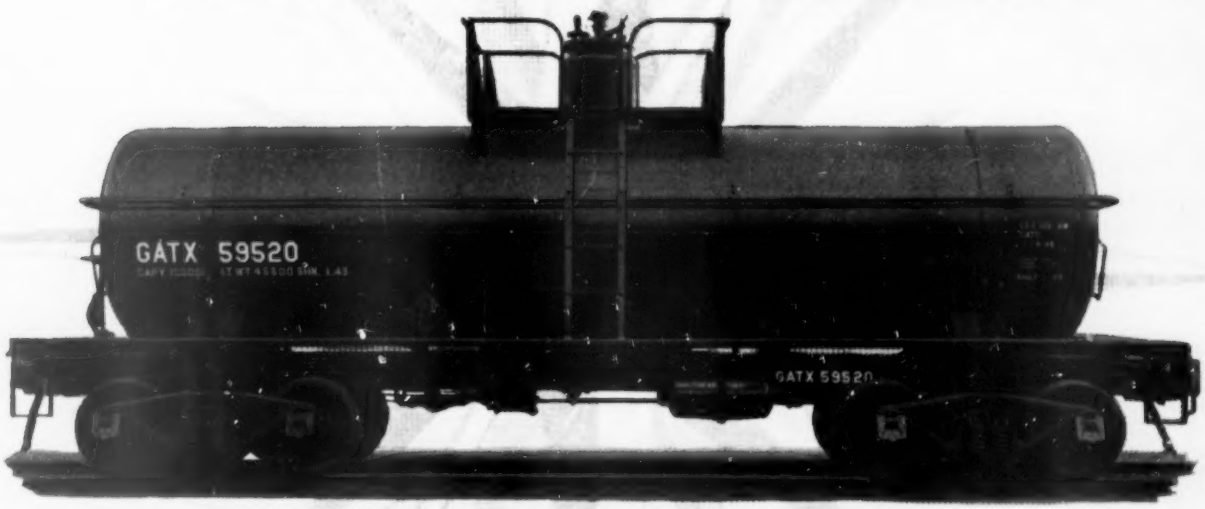
The author was associated with M. W. Kellogg Co. during the inception and development of the F.C.C. process. He is presently consulting engineer, specializing in the catalytic cracking processes and also in the application of both fluidized and moving-bed techniques to petrochemical processing. Moorman is a graduate of the University of Tulsa with a degree in petroleum refining.

everywhere the railroads go

GATX

tank cars carry bulk liquids

If you're planning a new plant, have General American help determine your future bulk shipping needs. Our experience gained in designing, building and operating 46,000 GATX tank cars of hundreds of specialized types will prove valuable to you.



General American Transportation Corporation

GATX GENERAL AMERICA

135 S. La Salle Street, Chicago 90, Illinois
OFFICES IN PRINCIPAL CITIES

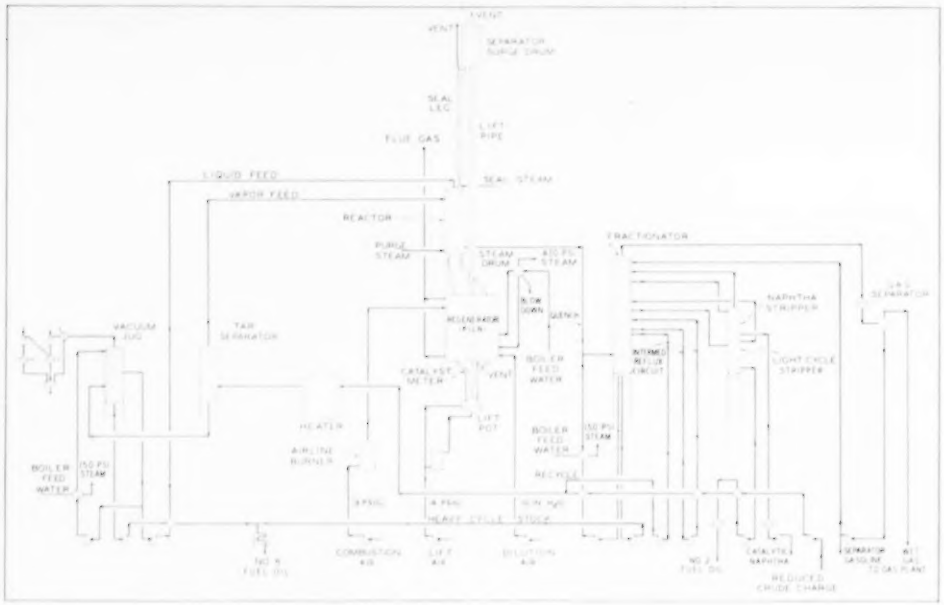


Fig. 1—Typical flow for T.C.C. unit including feed preparation and fractionation.

catalytic cracking capacity will be approximately 4 million barrels per day. *(For a further breakdown on catalytic conversion facilities see The Oil and Gas Journal, March 23, 1953, page 169).*

Thermal facilities . . . Thus, thermal processes have today become a secondary operation in refining crude oils. In some cases it is a necessary evil. Most refining companies would like to completely eliminate thermal cracking facilities, and process catalytically either total or reduced crudes. However, the catalytic processing of total or reduced crudes has been found to be impractical, and it is extremely doubtful that thermal cracking facilities will be entirely eliminated. There are a few isolated cases where thermal cracking has been reduced to a minimum and in one or two cases entirely eliminated. It should be pointed out that the thermal cracking figures indicated also include coking operations. Thus, it is believed that thermal facilities will always have to be available to coke or crack catalytic cycle stocks and heavy residual fuel oils.

Thermal vs. cat . . . The primary well-known difference between thermal and catalytic cracking is that higher yields of higher-octane gasolines can be produced catalytically than can be obtained by thermal cracking. High-octane gasoline can be produced thermally but at a severe loss in gasoline yields accompanied by high gas and fuel-oil yields. Still another very important factor is the fact that the catalytic cracking process can realize much higher stream efficiencies than can be obtained from thermal operations.

2—DEVELOPMENT

The investigations which led to the development of catalytic cracking were begun in France by Houdry in 1922. However, the process was not applied to gas oils and crudes until the period 1927-1930. In 1930 activities were transferred to the United States. During the period 1930 to 1940 the Houdry fixed-bed catalytic process was fully developed and several commercial installations were made. This type of process, though proved in operation, had the disadvantage of being an intermittent process and having a high initial investment and operating cost.

Three processes . . . During the period 1935-1940 laboratory and pilot-plant work had been carried out on three other types of catalytic cracking processes, namely the moving bed, the Suspensoid and the fluid process. The moving-bed process is a continuous operation in which the catalyst, consisting of solid granules with particle sizes in the range of 4-12 mesh, is continuously cycled between the reactor and the regenerator. The Suspensoid process involves the use of finely divided powders which are mixed with the oils in relatively low concentrations. The slurried oil is then pumped through a furnace and cracked at a temperature of 1,050° F. under a pressure of approximately 300 psi.

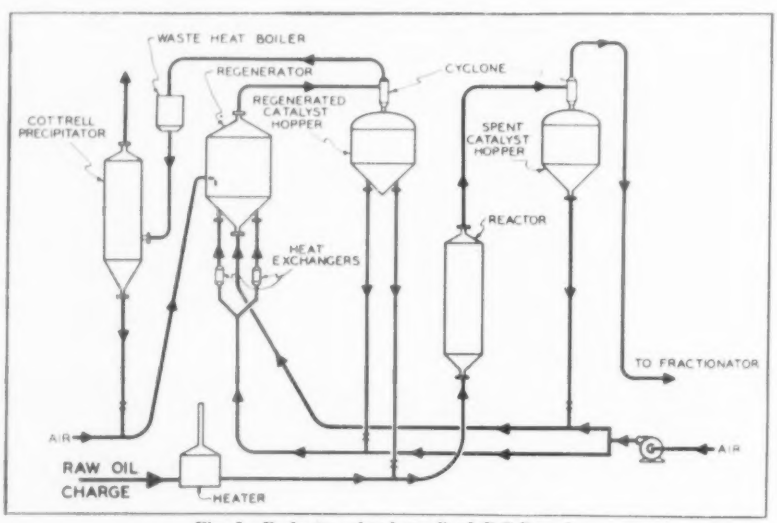


Fig. 2—Early "overhead type" of F.C.C. unit.

Oil Men Make New Engine Discovery

International U-450 provides 13,965 hours of pump jack proof

All new discoveries in the oil business aren't in the ground.

Here's one that progressive oil companies are making today and every day—something special in dependable, trouble-free pumping operations—the new line of Industrial Power units.

For example, the new U-450 six-cylinder engine shown here has already clocked 13,965 hours on a pump jack, bringing up the crude from a 5,500-foot well at the rate of 156 barrels in 24 hours.

One of Seven New Models

The U-450 is one of seven new six-cylinder engines recently introduced by International Harvester Company. This brings to twelve the carbureted engines in the full International line, ranging from 16 to 200 maximum horsepower.

12 Sizes of Power

Wherever there is oil, there's a place for International Power. With their adaptability, endurance and economy, these 12 sizes of rugged red International engines can solve your power problems on every pumping or drilling operation. Get the full International power story from your Industrial Distributor, Power Unit Dealer or Oil Field Supply House. You'll discover the dividends that can be yours when you use International "Power that Pays."

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

ONE OF 23 International engines doing a tremendous oil pumping job in this California canyon is this new natural gas U-450 six-cylinder engine.

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

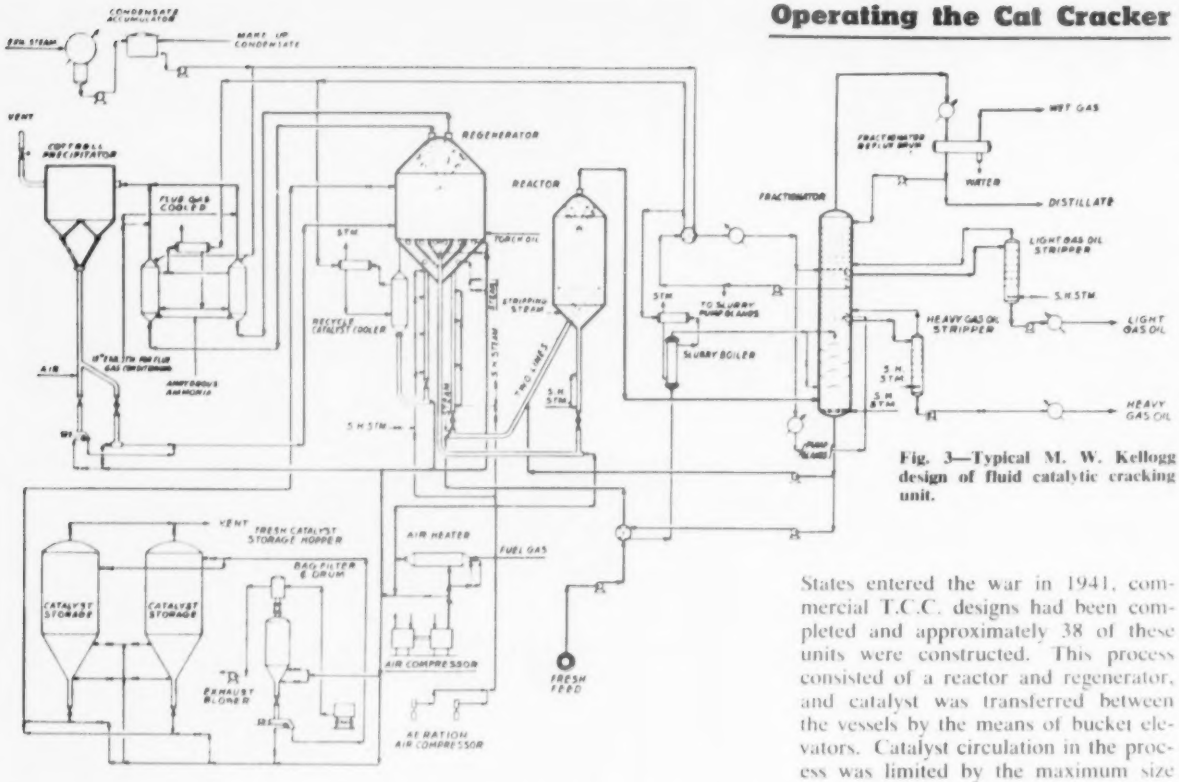


Fig. 3—Typical M. W. Kellogg design of fluid catalytic cracking unit.

In the fluid process the oil is cracked in the presence of finely divided catalytic powders, wherein the powder is maintainded in an aerated or fluidized state by the oil vapors and the regeneration air. The pwoder is continuously cycled between the reactor and the regenerator by pneumatic conveying using air, oil, and steam as the conveying media.

Still another catalytic operation that has been developed is the Phillips Cycloversion process. This process somewhat resembles the Houdry fixed-bed operation, inasmuch as it is a fixed-bed intermittent process. Since the moving-bed and fluid type of operations represent better than 88 per cent of the total catalytic cracking capacity, the present discussion will be limited to those two processes.

3—T.C.C. OR MOVING-BED PROCESS

The first moving-bed plant was a semicommercial 500-bbl.-per-day plant designed by M. W. Kellogg Co., and constructed at Llandarcy, Wales, in 1939. This plant was rather unique in that a lock-hopper system was employed for charging the catalyst into the reactor and discharging the catalyst out of the reactor. The regenerator consisted of a Herreshoff furnace, such as used in ore reduction, and the catalyst was conveyed between the regenerator and the reactor by means of Redler conveyors. The plant was operated for a short period during 1939 but was shut down on September 3, 1939, at the outbreak of World War II. Simultaneously Socony-Vacuum Oil Co., Inc., was developing a moving-bed process called the Thermofor catalytic cracking process termed T.C.C.

Bucket lift . . . By the time the United States entered the war in 1941, commercial T.C.C. designs had been completed and approximately 38 of these units were constructed. This process consisted of a reactor and regenerator, and catalyst was transferred between the vessels by the means of bucket elevators. Catalyst circulation in the process was limited by the maximum size of mechanical elevators that could be constructed. Due to this limitation the process was somewhat limited in the boiling range of feed stocks that could be processed. Furthermore, in many of the units considerable mechanical difficulties were encountered, which in turn seriously affected stream efficiencies.

Pneumatic lift . . . Subsequently, an

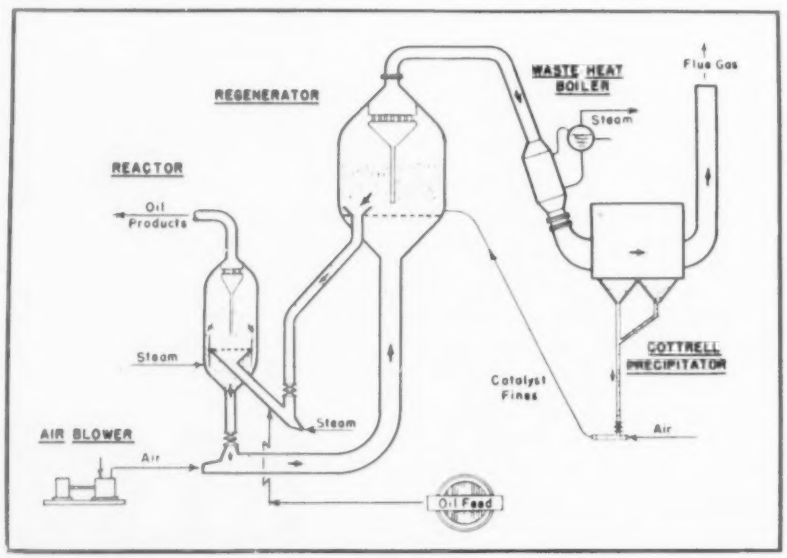


Fig. 4—Early fluid catalytic crackers installation as designed by Standard Oil Co. of New Jersey.

CYANAMID SERVICE:

source of progress throughout the petroleum industry

Cyanamid's Refinery Chemicals Department is staffed by specialists in every phase of petroleum production and refining. These specialists are backed up by extensive manufacturing facilities and continuing, industry-wide research.

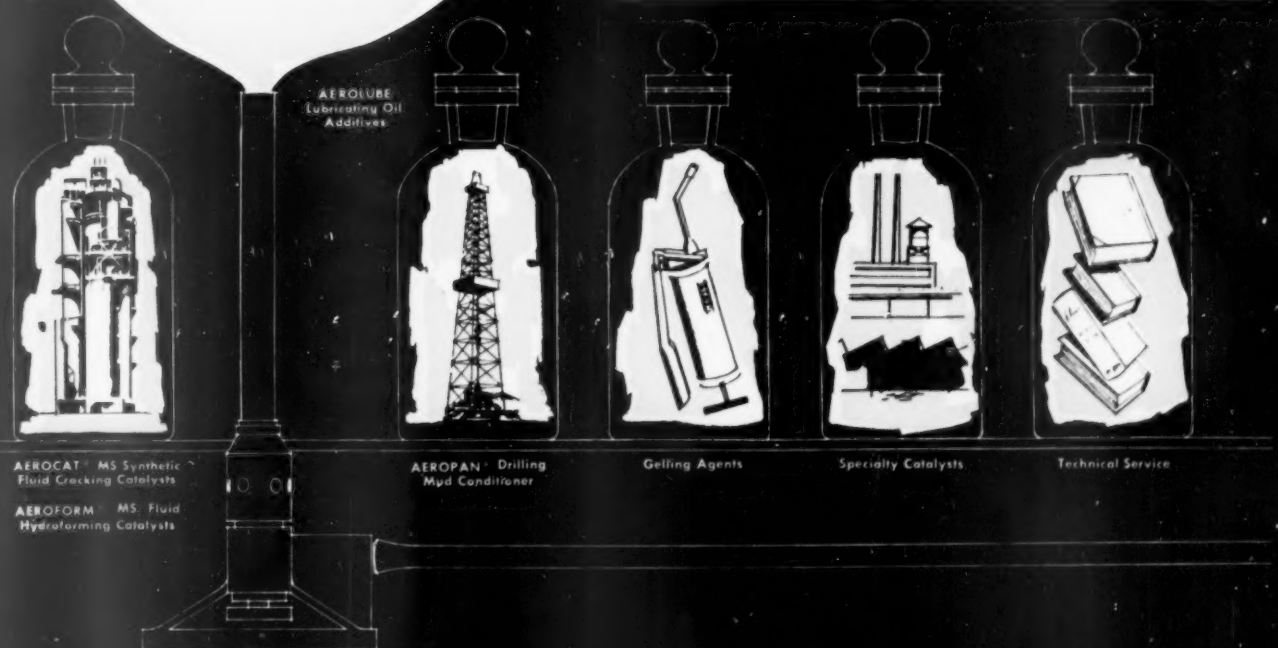
Thus the Refinery Chemicals Department—through Cyanamid Chemicals—is uniquely equipped to serve every phase of the petroleum industry.

For example: Over the years, AEROLUBE® lubricating oil additives have been developed as the answers to specific lubricating performance problems. Cyanamid's most recent contribution, AEROLUBE 106, is designed specifically for passenger car motor oils. AEROLUBE 106 provides maximum engine cleanliness under stop-and-go driving conditions so common to present-day automotive operation. In addition, oils treated with AEROLUBE 106 protect bearings against corrosion and deposits encountered in high speed, high temperature over-the-road operation. AEROLUBE 106 has inherent pour-depressant and water-resistant qualities not found in most detergent-type additives.

AMERICAN Cyanamid COMPANY

REFINERY CHEMICALS DEPARTMENT, DIV. OG-11
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal



Operating the Cat Cracker

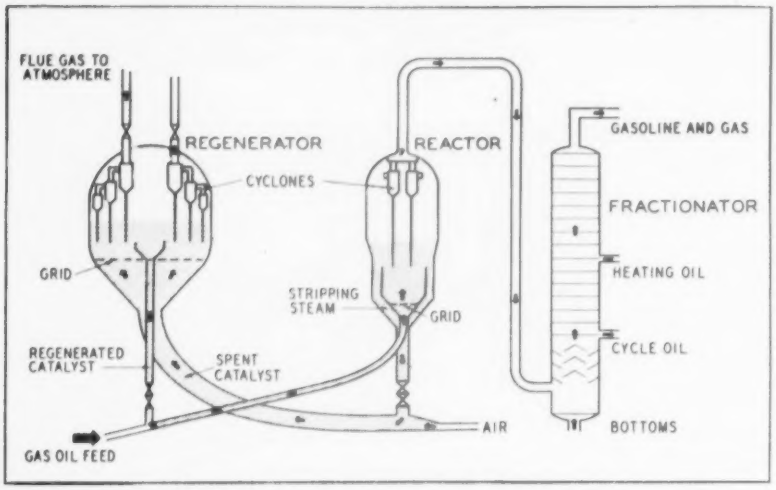


Fig. 5—A later modification of the Standard Oil Co. (N. J.) design shown in Fig. 4.

air or gas lift for catalyst circulation was developed which has considerably improved unit flexibility and diminished mechanical problems. The new T.C.C. process differs from its predecessor in three major respects: (1) The unit employs a pneumatic lift to elevate the catalyst to the top of the unit. (2) The reactor has been superimposed above the regenerator or kiln. Therefore, the catalyst is elevated only once for each complete cycle through the unit. With this design there is only one catalyst level in the system which must be controlled. (3) The catalyst circulation rate has been increased to permit a major simplification of the kiln by elimination of multiple-stage regeneration, with all of its attendant internal equipment. The higher catalyst-to-oil ratio permits operation at higher conversion levels and also permits the charging of much heavier feed stocks than was possible in the old process. These features contribute greatly to operating and maintenance simplification.

T.C.C. flow . . . A typical flow sheet of the modern T.C.C. process is given in Fig. 1. It will be observed that reduced crude is charged to the unit through a series of preheat exchangers into a furnace wherein the oil is vaporized insofar as possible and discharged into a tar separator. The vapors from the tar separator are charged directly into the top of the reactor. The liquid product from the tar separator is charged into a vacuum jug, the overhead from which is condensed and pumped as a liquid directly to the top of the reactor. The bottoms from the vacuum jug are taken directly to No. 6 fuel oil. The flow through the reactor is concurrent with the catalyst and the reactant vapors leave the base of the reactor and enter the fractionator or what is sometimes called the Syn tower. In the fractionator the vapors are quenched in the lower part, with the tower bottoms being discharged directly to No. 6 fuel oil. In many cases the heavy cycle stock which is withdrawn immediately above the desuperheating section is recycled back to the catalytic cracking unit. A side stream of light catalytic cycle stock is normally withdrawn and employed as salable No. 2 furnace oil. The overhead stream from the fractionator consists of gas plus 400° F. end-point gasoline which is discharged to the gas-recovery unit.

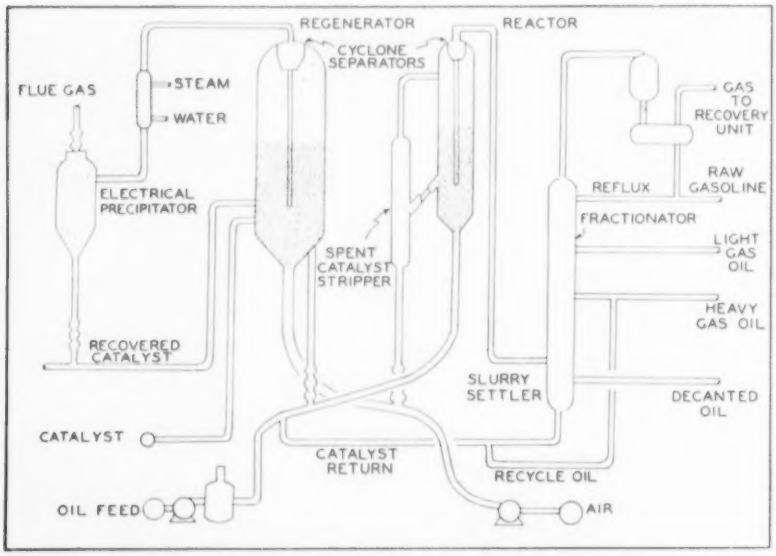
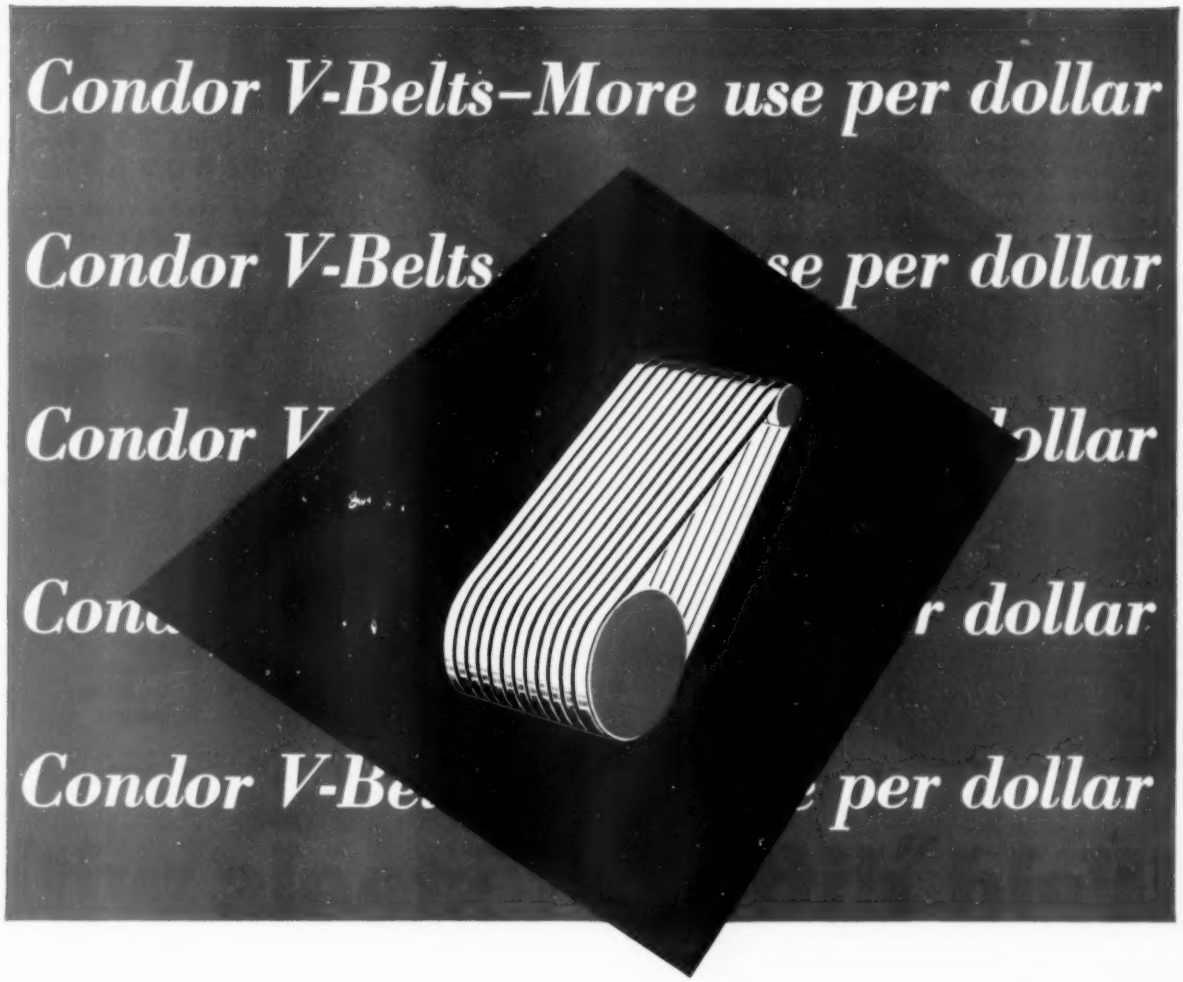


Fig. 6—Cutaway of later-design fluid catalytic cracking unit.

How gas lift works . . . The catalyst system is downflow or concurrent in the reactor and regenerator or kiln and is elevated to a separator or surge drum located above the reactor by means of a so-called gas lift. The operation of this gas lift has two principal controls: The first is a major gas-flowing stream that is injected at the base of the lift pipe. The second control is what is commonly called the secondary gas control which is injected above the catalyst bed in the lift pot. The secondary air is actually the control media. Normally, the gas velocities are in the range of 80-100 ft. per second. The amount of attrition that is encountered is a function of the design of the disengaging hopper, the lift-pipe velocities, and the catalyst particle sizes. In some quarters it is believed that the lift-pipe size has some bearing upon attrition rates and as a result it is believed that a multiplicity of lift pipes is required.

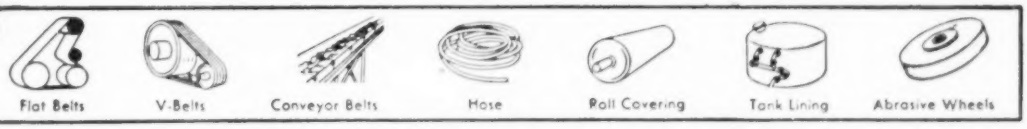
T.C.C. regeneration . . . The catalyst from the disengaging hopper flows downward through a seal leg into the top of the reactor through a distribution system which provides even flow through the reactor. At the base of the reactor the catalyst is stripped by means of steam and is introduced into the regenerator. In the regenerator the spent catalyst is regenerated by the means of introduction of air, normally through distributing elements in the catalyst bed. Part of the air flows countercurrently upward and part flows countercurrently downward. There is no substantial amount of crossflow.



MORE GRIP, LESS SLIP, LONGER LIFE . . . . Yes, you save money with Condor V-Belts on even the toughest multiple belt drive. Straight sidewalls provide more grip, less slip, longer life. They are the smoothest running V-Belts made, because every part is precision-balanced in manufacture. This, too, means longer life. Also in special oil-, heat-, static-resisting types . . . Get the engineering facts. Ask the R/M distributor for Bulletin 6868... He'll tell you, too, how you get MORE USE PER DOLLAR with R/M hose, transmission and conveyor belts.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls

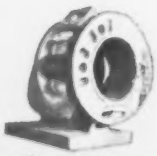
Weld "difficult" steels with little or no pre-heat!

use P&H LOW-HYDROGEN ELECTRODES

P&H has the industry's most complete line of low-hydrogen electrodes — many custom-built to match the chemical analysis or heat-treating properties of a variety of alloy steels. Being hydrogen-free, these electrodes eliminate underbead cracking — little or no pre-heat is needed to get high-strength welds on problem steels, steel castings, nickel-alloy steels, chrome-moly steels, .40 carbon castings, high-hardenable steels, aircraft and similar steels. There are other important advantages, too — for example, lower cost, compared to stainless-steel electrodes formerly used on many jobs. Ask your P&H representative or distributor for all the facts. Or write for bulletin 5-26.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4527 W. National Ave. • Milwaukee 46, Wisconsin

Chrome-moly header, typical of high-pressure, high-temperature applications.



Low-alloy casting, typical of applications where physical properties must be matched.

Alloy gear rim, typical application matching heat-treating properties of parent metal.

Excavator body, typical of heavy sections welded with P&H Low-Hydrogen Electrodes.

the P&H Line

2495

P&H

WELDING HEADQUARTERS

—that's where you find cost-cutting answers to welding problems

P&H AC WELDER

Any heat at your fingertips — right at the work — with Dial-lectric Instantaneous Remote Control. Sizes up to 625 amps., NEMA rated. Connectable to 220 and 440 volts.

P&H WELDING TWINS

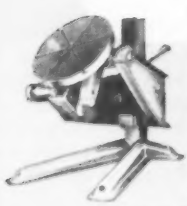
P&H DC RECTIFIER WELDER

Right now —at the work — fingertip Dial-lectric Control gives you the heat you need. Three sizes, 200,. 300, and 500 amps., NEMA rated.

P&H WN-301 *Engine-Driven* DC ARC WELDER

It's portable—weld anywhere, anytime. Dial-lectric Control gives you fingertip heat control at the work — for faster, better welding. Runs at only 1750 rpm. Welding service range, 60-375 amps., NEMA rated.

P&H POSITIONERS



One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

Ask your P&H representative or distributor for complete information, or write for free bulletins.

P&H WELDING DIVISION

HARNISCHFEGER CORPORATION

4527 West National Ave., Milwaukee 46, Wis.

2495A

The exothermic heat of regeneration is removed by: (1) The catalyst circulation rate; and (2) by the generation of steam which may consist of either internal or external coils. The hot regenerated catalyst is then introduced by gravity into the lift pot at which point the cycle is then again started.

T.C.C. and F.C.C. . . . In both the T.C.C. or moving bed and the fluid catalytic cracking processes the heat requirements and the reactor heat balances are essentially the same. Normally the T.C.C. process will operate with a somewhat higher feed preheat temperature necessitating heat removal in the regenerator or kiln. Cracking temperatures with comparable catalyst and feed stocks are generally the same when operating for the production of motor gasoline. The reactor pressure is approximately the same for both processes. However, the regenerator pressure is usually considerably higher for the fluid process.

Concurrent flow . . . From an examination of Fig. 1 note that both the oil and the catalyst are downflow or concurrent in the T.C.C. cracking process. However, all the wartime T.C.C. units operated commercially with countercurrent flow of oil and catalyst. A few have still not been converted to concurrent flow. Concurrent flow appears to be more desirable when considering motor-gasoline production. Both experimental and commercial operations have demonstrated that for countercurrent flow (and dependent upon the particle size) excessive gas velocities will cause the bed to surge and even boil which further complicates the process by necessitating additional-catalyst-recovery equipment. It is obvious, however, that with the concurrent operation it is necessary to eliminate and minimize the production of fine material since the presence of these fines will create excessive pressure drop with the net result of stoppage of flow or the necessity for a much more complicated and expensive design.

4—THE FLUID PROCESS

During the period 1935-1940, the same period through which the T.C.C. process was being developed, some of the major companies began to concentrate on the fluid process. In 1939 a 100-bbl.-per-day experimental unit was installed at Baton Rouge, La., this unit being designed by Standard Oil Development Co. of New Jersey.

Screw pumps . . . The first design of this plant incorporated the use of screw pumps which pumped the catalyst through the reactor and regenerator. Both the reactor and regenerator consisted of vertical pipe coils. The pressure drop encountered in the system was extremely high, resulting in excessive erosion of the screw pumps. It became obvious from this work that the design of a commercial plant on this basis would be uneconomical due to the high initial investment and operating cost, accompanied by extremely difficult mechanical problems.

The fluid bed . . . It was during this period that through laboratory studies conducted by M. W. Kellogg Co. and Standard Oil Development Co. and work carried out at M.I.T., that the phenomenon of the fluid bed was revealed. Simultaneous experimental work on the 100-bbl.-per-day plant disclosed the basic principles of the standpipe, permitting the elimination of the screw pumps. As a result, the 100-bbl.-per-day plant was redesigned to incorporate the standpipe and the fluid-bed principles. This represented the second phase in the development of the fluid process.

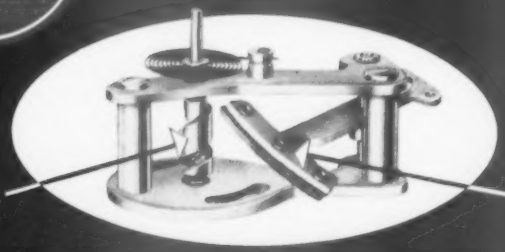
Overhead type . . . Both the reactor and regenerator were designed for relatively low superficial gas velocities and the circulating catalyst entered the bottom of each vessel and left the top of the vessels with the exit gases. This is commonly called the overhead type. A typical design is presented in Fig. 2. In 1940 a 13,000-bbl.-per-day commercial plant of this type was designed, based upon experimental data obtained from the 100-bbl.-per-day plant. This plant was put into operation in 1942, and subsequently two other units were designed and constructed on the same basic design features.

Bottom drawoff system . . . Even before the above plant was completed, further simplifications were developed by process engineers and tested on the experimental plant. The primary simplification consisted of the use of the upper portion of the reactor and regenerator as a settling zone for catalyst recovery. The circulating material was withdrawn from the bottom of the fluid bed. This type of system is commonly called bottom drawoff and represents the common variety of fluid catalytic cracking units that were built during the war and subsequently.

Wartime units . . . Upon the entry of the United States into World War II in 1941, commercial designs on the revised fluid system had been completely developed. These designs were based upon the information obtained from Kellogg pilot-plant experiments and from the 100-bbl.-per-day unit at Baton Rouge. Almost immediately these de-

ACCO products

HELICOID GAGES



75 MILLION CYCLES
No Appreciable Wear

HELICOID Gages . . .

No Gears, No Teeth

• In a break-down test by U. S. Testing Co., two HELICOID Gages showed no appreciable wear on cam or roller after being pulsated 1200 times per minute for 75 million cycles. Two stainless steel gear type movements, tested similarly and simultaneously, "froze" their gears so pointer would not return to zero after only 500,000 pulsations.

Retain Original Accuracy

Because of the ability of HELICOID'S cam and roller movement to stand up under unlimited pulsations, HELICOID Gages retain original accuracy longer, last longer, and cost less per gage, per year. Movement protects itself by releasing cam from roller at maximum dial graduation. Remeshing is positive, automatic, and instantaneous. No finer gages are made, yet you pay no more than for other quality gages.

Many Sizes, Many Styles

HELICOID Gages are made for vacuum, pressure, or compound service—in all pressure ranges. White, black, or radiant faces. Wall, stem, flush, and panel mountings, or flangeless cases.

See your distributor or write today for CATALOG G-2

ACCO

HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

927 Connecticut Avenue • Bridgeport 2, Connecticut

HELICOID Pressure • Vacuum GAGES

signs were put into commercial application. Approximately 32 units were constructed during the period 1941-1945, incorporating the above basic principles. These designs varied somewhat in that M. W. Kellogg Co., Standard Oil Co. of New Jersey, and Universal Oil Products Co. incorporated different ideas. Basically, however, all of the designs were quite similar. Fig. 3 is a typical installation as designed by Kellogg. A typical early installation as designed by Standard is shown in Fig. 4. A later modification which incorporated some simplification in design is indicated in Fig. 5.

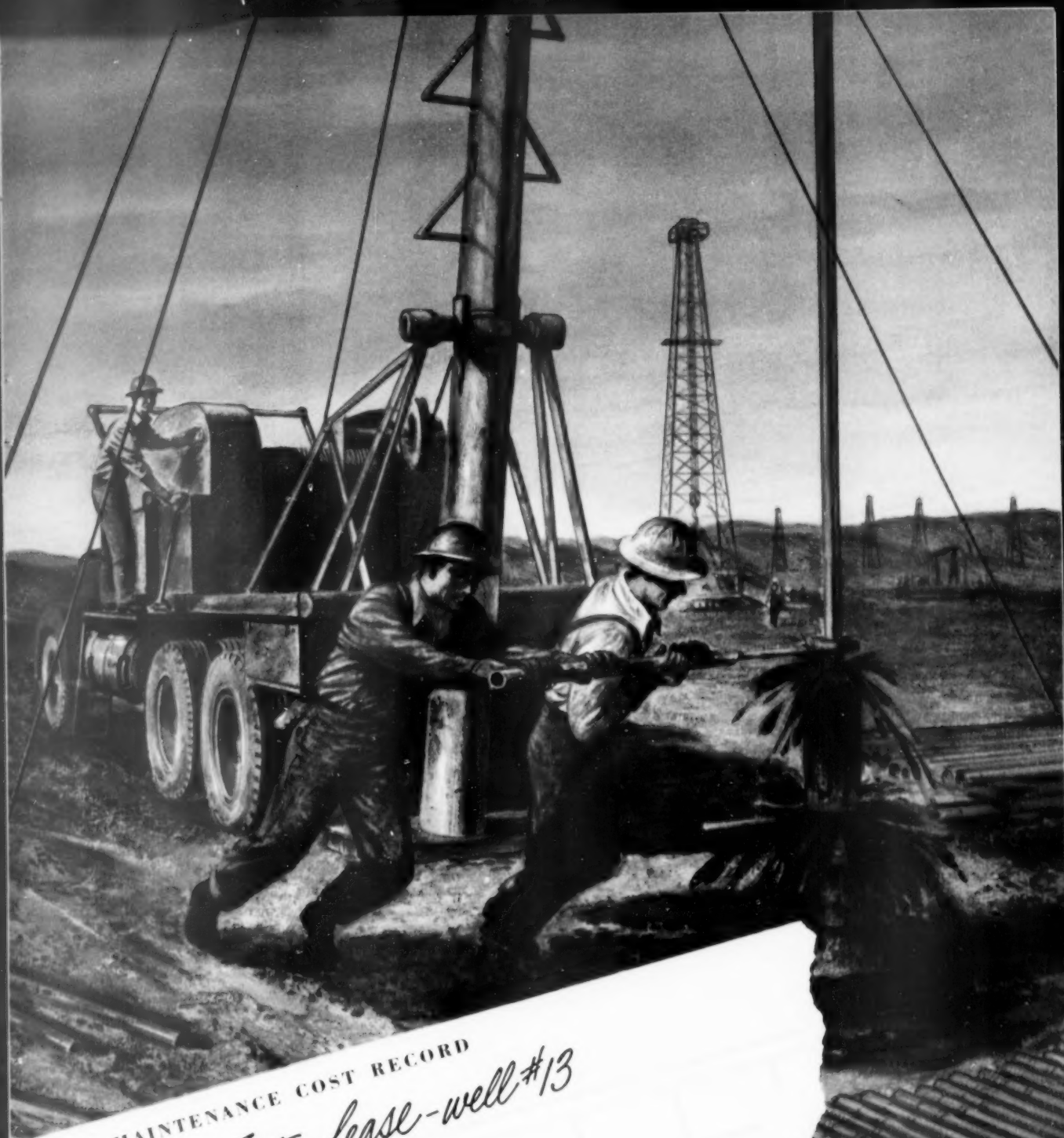
Later design . . . In Fig. 6 is presented a cutaway of a typical later design catalytic cracking unit. This unit has an over-all height of approximately 120 ft. This reduction in over-all height was brought about through reduction in safety factors, improved technique in calculating system pressure drops, and utilization of operating experience in mechanical design of the earlier units.

In this design, fresh gas-oil feed is pumped through a preheat furnace wherein the oil is heated to 600°-700° F. However, in other designs heat exchangers are employed. The oil is then injected into the reactor inlet line at the juncture of this line and the regenerated catalyst standpipe. At this point the oil is vaporized by contact with a relatively large quantity of hot regenerated catalyst. The ratio of catalyst to oil is normally in the range of 8-10 by weight. The mixture of oil vapors and catalyst flows through the reactor inlet line to the reactor proper where the cracking occurs in the presence of a fluidized bed of catalyst.

The cracked oil vapors leave the top of the catalyst bed and pass upward through a disengaging space above the bed. In this space most of the catalyst settles out and returns to the bed. The vapors, plus a small quantity of powder, then enter a single stage of cyclones where approximately 90 per cent of the entrained powder is removed and then leave the vessel and enter the fractionator. In the base of the fractionator, the remaining traces of powder are moved by scrubbing with a circulating stream of oil. The catalyst is settled in a settling zone and returned as a slurry oil to the reactor inlet line.

Fluid regeneration . . . During the cracking reaction, carbon is deposited upon the catalyst, reducing its activity, and it is necessary to regenerate and burn off this residual carbon. The spent catalyst is removed from the reactor and introduced into a stripper where

(Continued on page 123)



WELL MAINTENANCE COST RECORD

Foster lease - well #13

stripping job

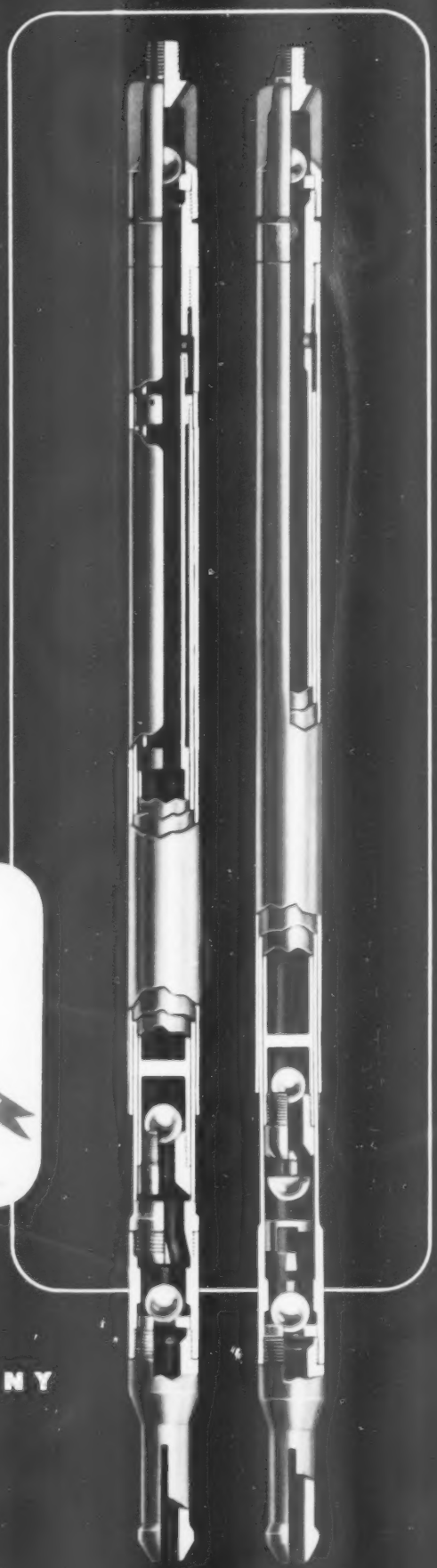
$987.14

The odds are 100 to 1 that this stripping job could have been prevented with an...

oilmaster

MULTIPLE TUBE FLUID PACKED PUMP

Write for descriptive literature



FLUID PACKED PUMP COMPANY

MAIN OFFICE AND PLANT, LOS NIETOS, CALIFORNIA

Distributed by The National Supply Co., Pittsburgh, Pa.

Export: The National Supply Export Corp., 30 Rockefeller Plaza, New York

Co-Distributors: Berry Supply Store, Beacon Supply Co., Industrial Supply Co.

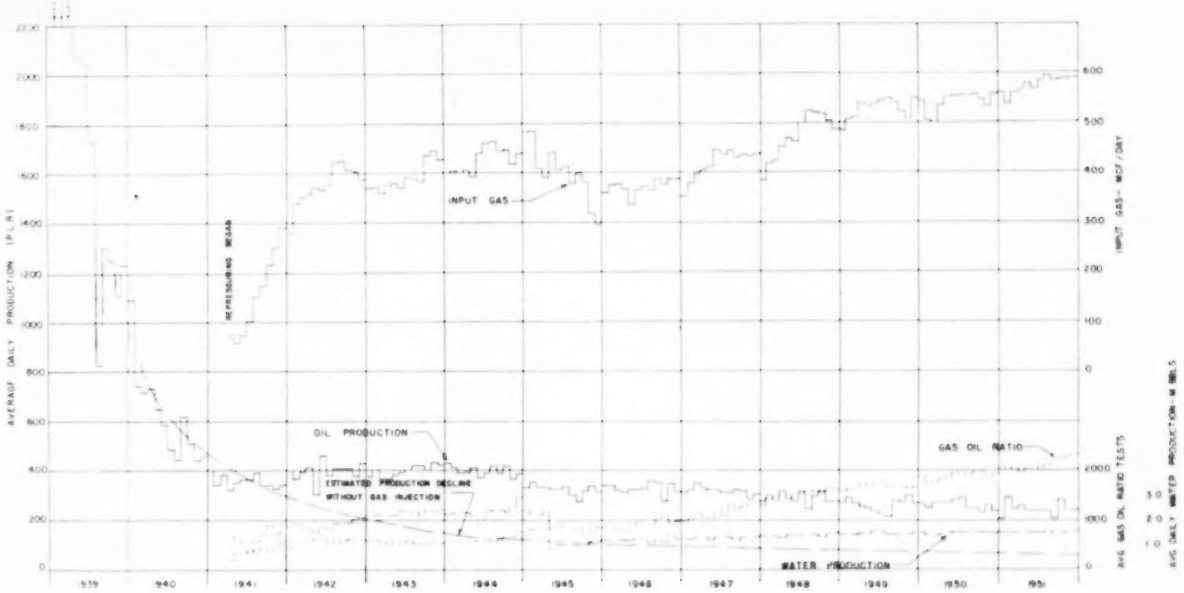


Fig. 1—Production curve of Ezzel field, in McMullin County, Texas, which started its pressure-maintenance program in 1941.

SECONDARY RECOVERY IN TEXAS

Pressure Maintenance Increasing Oil Recovery By Millions of Barrels

Here are details on some of the more successful projects

A LARGE number of pressure-maintenance projects now under way in Texas fields will increase ultimate recovery of oil by many million barrels. These programs will add millions of dollars in extra royalties to royalty owners.

These pressure-maintenance projects are doing three important things in a number of fields:

- Gas-cap voidage is being slowed down considerably.
- Abnormal rate of water encroachment is being retarded.
- Wells are flowing longer, and producing expense is lessened.

Examples . . . A good example of slower gas-cap voidage due to pressure-maintenance is Pridham Lake-West field of Victoria County, on the Texas Gulf Coast. This project, which was begun in December 1948, has resulted in considerable lowering of the gas-cap voidage, and a cut in the previous abnormal rate of water encroachment has been noted. Ultimate recovery from the field is expected to be increased by 600,000 bbl.

Another example of how the projects are putting new life in gas-solution-drive areas is Ezzel field, of McMullen and Live Oak counties. Since the gas-injection program was started in April 1941, daily oil production has been increased 800 bbl. over previous output.

Here are a few of the pressure-maintenance projects, selected from a list of many, which are proving successful:

District 1

Ezzel field . . . Production in this area was discovered in 1937. Cumulative oil production was 2,371,393 bbl. to January 1953. Oil accumulation is stratigraphically trapped and the productive area covers about 1,100 acres. The trap is on the flank of a northeast-southwest trend at a depth of 1,550 ft. Gas injection for pressure maintenance was decided upon due to presence of a gas cap and a partial water drive. Gas comes from nearby wells and is injected at a pressure of 120 psi.

Production has risen 800 bbl. over the daily average output of 360 bbl. when the program was started in 1941. See Fig. 1. Without the pressure-maintenance program, average daily production would have been only 300 bbl. daily. Over the past 12 years, in addition to water production remaining rather constant, input gas has increased to about 600,000 cu. ft. per day and the gas-oil ratio has climbed from 300:1 to 2,400:1, as of early 1952.

Early in that year the reservoir had 26 injection wells and 71 producing wells.

The principal operator is Murphy Corp.

Hilbig field . . . This reservoir is a serpentine plug, and was discovered in February 1933. Gas-injection work was started in October that year to arrest decline in pressure. Estimated productive area of the reservoir is 300 acres, and average depth to top of pay is

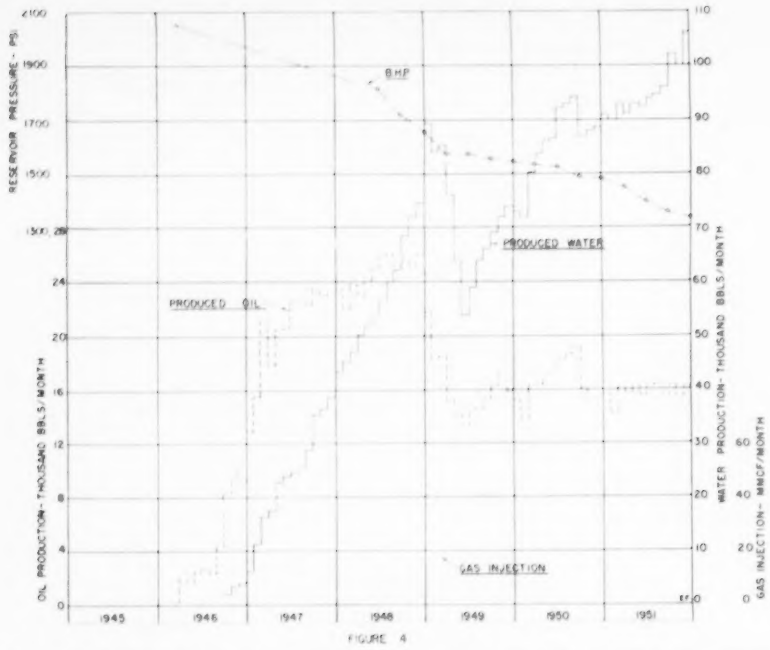


Fig. 2—Production curve for Pridham Lake-West field, where it is estimated that pressure maintenance will increase the ultimate recovery from the field by about 600,000 bbl. of oil.

2,450 ft., with average pay thickness 193 ft. Porosity averages 24.1 per cent, and oil is 37.4° A.P.I. gravity.

Original reservoir pressure was 1,228 psi. and estimated pressure at time of gas injection was 1,130 psi. Pressure had dropped to 730 psi. in early 1952.

Produced gas in this field has been injected back into the secondary gas cap. There were 1 gas-injection well and 12 producing wells in 1952. Average daily injection rate was 576,000 cu. ft. at that time. Injection pressure varied from 1,160 psi. in 1933 to 800 psi. in July 1952. Cumulative oil production from start of injection to 1953 was about 3,619,105 bbl. This project is considered effective with good recovery for a pressure decline from 1,228 to 730 psi. The operator is Humble Oil & Refining Co.

Lytton Springs field . . . This area, located 7 miles northeast of Lockhart in Caldwell County was discovered in March 1925. Data are not available but present information indicates that the reservoir rock is a serpentine plug about 2 miles in diameter and 800 ft. thick at its center. The mass thins out somewhat uniformly from its center. This project, a pilot flood composed of 14 wells, is on the M. L. Brewer et al lease.

The limited information available shows that the reservoir-drive mechanism was solution gas. It is believed that gravity drainage has been responsible for part of the recovery of the field up to the present. The presence of a gas cap or existence of a water drive has never been indicated.

The fact that some of the cores taken have had a residual-oil saturation of 85 per cent in some of the intergranular porous sections indicated a low order of primary recovery.

Difficulty was experienced in evaluating this reservoir for secondary recovery operations. The amount of coring done has been insufficient to get an over-all good average porosity. Because of the small amount of coring done, correlation of the porous zones was not possible. Likewise, the effects of fracturing on the primary recovery could not be evaluated. The porosity in the igneous Serpentine reservoir is both intergranular and intermediate, and is estimated to be an average of 6.5 per cent.

A pilot salt-water-injection program was started in December 1951 and by June 1952 about 120,840 bbl. of water had been injected into the serpentine plug. The salt water proceeds upward through the well bore, from the Edwards lime, through a teleflood meter, into the plug. The meter controls the rate of injection and measures the amount of water coming from the Edwards formation. The natural head of water existing between the aquafer in the Edwards and the serpentine formation provides the energy for the water drive.

It is too early to conclude whether the project is to be effective but computations indicate that the flood will reduce the residual-oil saturation to 32 per cent of the pore space.

The principal operator is Gulf Oil Corp.

District 2

Burnell, South, field . . . Burnell, South, field in Karnes County was discovered in August 1937. The W. H. Boyce lease includes this 130-acre-project which has a cumulative oil production of 1,495,929 bbl. as of January 1953. Oil comes from the Pettus sand at an average depth of 3,650 ft. A northeast-southwest anticlinal structure which contains the oil is terminated by a strike fault.

Gas injection began in June 1947 and as of early 1952 there were three gas-injection wells and three water-input wells. Gas injection was started at a rate of 10,000,000 cu. ft. per month, when average production was about 2,500 bbl. per month. The monthly rate of oil production has been as high as 7,500 bbl. in early 1946. The injection of gas has been effective in that 107,655 bbl. of produced oil has been credited to the program.

Because the monthly rate of oil production dropped to 2,000 bbl. early in 1951, water injection was started. The computed additional oil attributable to water is 183,000 bbl. Luling Oil & Gas Co. is the principal operator.

Colette Creek, South, field . . . This Victoria County field was discovered in November 1947. Gas injection was begun in November 1949. The reservoir is in the Willemin sand of Frio age at a depth of 4,300 ft. The productive area is about 360 acres. There was no apparent gas cap or water drive and it was indicated the field was a gas-solution-drive reservoir.

The rapid decline of pressure has been partially checked. Up to the time of gas injection, about 230,885 bbl. of oil has been produced with a pressure decline from 1,950 to 1,680 psi. The gas is injected into a structurally high well and to early 1952 cumulative gas injection has been 416,583,000 cu. ft. at an injection pressure of 1,600 psi. The average rate of gas injection per day in early 1952 was 750,000 cu. ft. It is estimated that an additional 500,000 bbl. of oil will be recovered as a result of gas injection.

The principal operator is Monterey Oil Co. of Texas.

Falls City field . . . This area, located in Karnes County, was discovered in June 1945. The lower Pawelek reservoir is undergoing pressure maintenance since it is one of the chief producing zones of the field. An anticline with closure against the downthrown side of a fault represents the

oil structure. The reservoir oil was initially undersaturated at a pressure of 2,625 psi., with no water drive present.

Water injection was started in March 1948. Water available from eight zones of the Wilcox was used for the injection program. A closed system was employed and the water was injected below the oil-water contact.

There had been a decline in pressure from 2,625 to 2,275 psi. in producing 697,904 bbl. of oil, up to the time of pressure maintenance. About 1,990,000 bbl. of water has been injected since that time. Oil, produced during pressure maintenance has amounted to 1,900,000 bbl. (1952) with a pressure decline of only 90 psi.

Southern Minerals Corp. is the principal operator.

Pettus field . . . Pettus field, of Bee County, was discovered in 1929. Cumulative oil production to 1953 has amounted to 5,533,826 bbl. The structure is an anticline with an up-to-the-coast fault. Production is from the Pettus sand which is productive over about 440 acres. The type of drive during the primary phase was gas-cap solution drive along with a partial water drive. The estimated original pressure was 1,850 psi. At the start of gas injection in June 1944 the pressure had dropped to 90 psi. Since that time 1,500,000,000 bbl. of oil have been produced as of early 1952 and the reservoir pressure has risen 3.5 psi.

The principal operator is Union Producing Co.

Porter field . . . Porter field, of Karnes County, was discovered in June 1943. The Pettus sand is the productive area of the reservoir and is estimated at 329 acres. Seven producing wells, as of early 1952, represented the total development of drilling. The plunging anticline representing the structure for oil is closed on the north, south, and east by faults and by a sand pinch out on the west. During the primary production period the reservoir operated under a solution-gas drive. Just before injection of water the field also operated under a secondary gas-cap expansion. About 675,000 bbl. of oil was produced during the primary phase, with a pressure drop from 1,730 to 868 psi.

Since water injection started in March 1948, a total of 413,839 bbl. of water had been put into the reservoir below the oil-water contact up to 1952. In early 1952, 303 bbl. per day of water was being injected at an average pressure of 2,079 psi. To increase the effectiveness of the project, gas injection was initiated in August 1949. As of January 1952 the pressure decline had been arrested at 825 psi. It is believed an additional 800,000 bbl. of oil will be produced as a result of this project.

Magnolia Petroleum Co. is the main operator.

Pridham Lake-West field . . . This area is located 3 miles west of the city of Victoria. The field was discovered in March 1946, and there are about 500 productive acres in the reservoir, which is developed with 22 producing wells. Cumulative oil production to 1953 is 1,369,243 bbl.

The oil zone, at a depth of 4,672 ft. and with an effective thickness of 14½ ft., is the Tyng reservoir. The structure is a low-relief domal closure with a strike fault at the east. The initial pressure was 2,050 psi.

In 1948 a critical situation was developing in that the gas cap was being voided at a higher rate than the oil column. Bottom-hole-pressure data along with water encroachment indicated that an effective water drive was present. The excessive voidage of the gas cap would tend to make oil go into the gas cap where considerable oil would be lost wetting the sand grains. Some oil would be lost due to rapid movement and coning of water.

Two producers were converted to injection wells in December 1948. See Fig. 2. At this time separator gas was injected at a pressure of 1,470 psi. Up to January 1952 gas had been injected into the gas cap at a pressure of 1,490 psi. Although the pressure continued to decline at a slower rate, several benefits were realizable: (1) Gas flaring was discontinued, (2) the rate of gas-cap voidage was cut down, and (3) the abnormal rate of water encroachment was retarded.

Up to January 1952 it is estimated 330,000 bbl. of oil produced was attributable to gas injection. It is considered that the project will increase the ultimate recovery from the field by about 600,000 bbl. of oil.

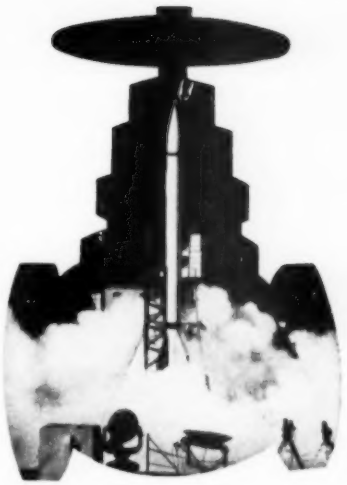
Acknowledgment

A survey of Secondary-Recovery and Pressure-Maintenance Operations, by Engineering Department, The Texas Railroad Commission provided source data.

BOOK

IRA RINEHART'S OIL AND GAS DIGEST, covering the Rocky Mountain area. Published by Rinehart Oil News Co., Box 1208, Dallas.

This is a new monthly digest giving comprehensive summary of well-completion information on current discoveries, important extensions, and significant dry wildcats in the Rocky Mountain area, including the Williston basin. Each well is reported on a separate page of this pocket-size manual with completion data and a section of the electric log printed on the front side and a plat of the area on the back.



UP AND OUT OF THIS WORLD!

● Most of the problems of flight into space have already been solved—design, metals, motors, controls, even the medical and psychological aspects of transporting men safely into space. Still remaining: the development of a suitable fuel. It will have to be powerful enough to propel its own weight, along with the ship it fuels beyond the pull of gravity.

Some of the newest liquid fuels, such as white fuming nitric acid, concentrated hydrogen peroxide and nitrogen tetroxide, are already being produced commercially for test rockets, guided missiles and jet planes. Contamination of these concentrated fuels by corrosion would create a serious problem by clogging injector nozzles and depositing sludge.

To prevent this contamination, leading manufacturers of rocket fuels use many ALOYCO corrosion-resistant valves in the processing and storage of their products. Constant research, backed by 25 years of production experience, have kept ALOYCO valves abreast of the newest developments in this and other fields of industrial processing. ALOYCO valves go hand-in-hand with chemical progress.

If corrosives play a part in your business, write to the *Aloyco Corrosion Engineering Service* about your specific valve problems.

ALLOY STEEL PRODUCTS CO., INC.
1314 West Elizabeth Avenue, Linden, N. J.
3.20

PROBLEMS IN HYDROCARBON EXTRACTION—2

. . . More on thermodynamic data required for "deep" extraction of hydrocarbons

by D. L. Katz,* R. H. Schatz,* and B. Williams*

THERMAL properties are required to obtain heat balances in process design. Effects of temperatures on the enthalpy of gaseous and liquid streams are readily obtained[23 29] and the effects of pressure on the enthalpy of natural gases were determined by calculation.[9] The real problems lie in heats of vaporization or solution[36] for mixture. These properties are most difficult to determine at pressures approaching the apparent convergence pressure. Although the latent heat of vaporization becomes zero at the critical temperature, for a pure constituent, there is a heat vaporization or condensation for the constituent above its critical point as it dissolves or evolves from a solution.

The mixing of liquid hydrocarbons or of vapors at moderate pressures does not result in significant thermal effects, i.e., they approach ideal solutions. Thus the enthalpy of a mixture may be found by adding the enthalpies of the constituents therein. Enthalpy charts for pure constituents are available and may be used for this purpose. Fig. 5 is an example.

The heats of vaporization are related to the change in equilibrium constant with temperature by one version of the claperyon equation:

$$\left(\frac{d \ln K}{dT}\right)_{P, B_L, B_2} = \frac{\Delta H}{RT^2}$$

*University of Michigan. Paper given at N.G.A.A. meeting, Houston, 1953.

Part 1 of this report dealt with equilibrium constants. Part 2 covers thermal properties, density, viscosity, and surface tension. Bibliography is included.

Thus, in cases where the changes in equilibrium constant with temperature are known accurately, the enthalpies of the phase change may be computed.

Use of enthalpy charts . . . Where heat balances for mixtures are made under conditions in which the behavior may be considered ideal, the summation of individual enthalpies taken from pure charts does not lead to any serious error.[23] However, the charts are not generally applicable as in the high-pressure absorbers in cycling plants. For example, at 2,000 psi. and 90° F. methane is in the liquid state at conditions above its critical point. The heavier components like butane or propane are in the vapor phase in the cycling plant while as pure components they would be subcooled liquids. Obviously, if heats of solution to and from mixtures are different from latent heats of the pure compounds, the temperature-enthalpy diagrams are not directly usable.

Sometimes heat balances are made or heats of solution are determined by extrapolating the vapor lines into the pure liquid region as shown on Fig. 6 for the 400 and 600-psi. lines.[35] Fig. 5 shows a curve for methane when dissolved at temperatures greater than its critical. Another version of these charts has been proposed by Peters[29] in Fig. 6, in which the enthalpy of a component in solution above its critical temperature is given as a function of the molecular weight or molal average boiling point of the liquid phase. This is a means of recognizing the effect of composition on the critical or on the convergence pressure.

Another method by which heat balances for mixtures can be computed is based upon the charts furnished by Brown and Holcomb[7 8] which give the enthalpies and specific heats of hydrocarbons in the liquid and in the vapor state at zero pressure. The enthalpies of the constituents for any liquid or vapor phase can be summed up to give the enthalpy of a mixture at zero pressure. The effect of pressure upon the enthalpy of a mixture is then estimated from a chart which gives the enthalpy correction as a function of the pseudo reduced conditions. For pure compounds, this method gives the same type of results as the use of Maxwell's charts.[21] This correction for effect of pressure on mixtures is valid only for mixtures which obey the theorem of corresponding states and consequently will give results which are, at best, doubtful for mixtures with nonhydrocarbons, such as nitrogen and carbon dioxide.

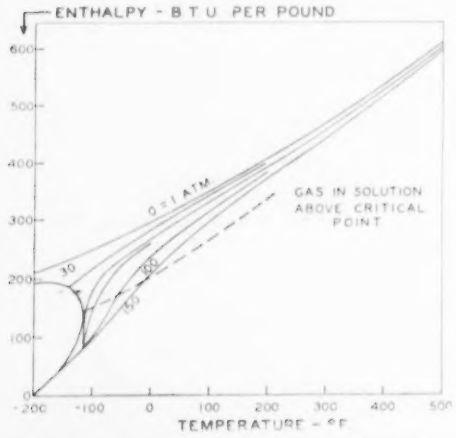


Fig. 5—Enthalpy of methane (after Maxwell).

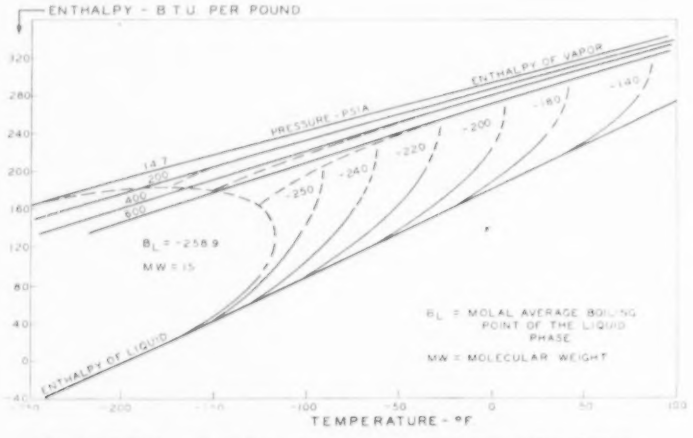


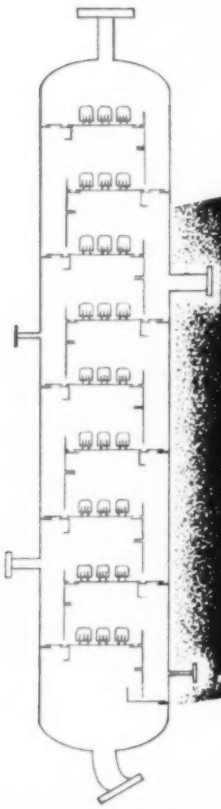
Fig. 6—Enthalpy of methane in hydrocarbon mixtures (after Peters).

DESIGN YOUR PROCESS REQUIREMENTS WITH COMPLETE FREEDOM OF LAYOUT

Glitsch CAN FABRICATE TO YOUR SPECIFICATIONS

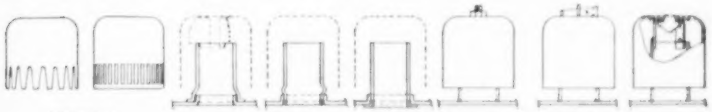
This is the *Glitsch* "TRUSS-TYPE" Mechanical Design

You specify your process requirements



GLITSCH Towers and GLITSCH "TRUSS-TYPE" Bubble Trays are now fabricated by GLITSCH and delivered to job site ready for immediate economical erection

GLITSCH "TRUSS-TYPE" lightweight trays, simple and adaptable in design, can be utilized for any process requirement with respect to tray size, process layout, type of flow, type and shape of downcomer, weirs, wells, and size and shape bubble caps as well as a suitable corrosion resistant material. Process engineers are not bound to standardized patterns. In collaboration with GLITSCH engineers, customers' management and engineering staffs can effect definite savings in initial designing while planning exact fabricated features desired.



...279 Cap and Riser Assembly Designs

Dies are available for 279 different cap and riser assemblies. Bubble cap styles can be furnished in a wide range of slots. Hold down styles simplify clean-outs, reduce "off-stream" time to a minimum.

Glitsch Service

World-wide service in initial planning, designing and fabrication of towers and internal equipment based on specific customer requirements, engineering surveys of existing facilities and cost analyses are promptly available.

Glitsch "TRUSS-TYPE" Bubble Trays, Towers and other Petroleum Refinery, Chemical and Industrial Equipment

Glitsch
FRITZ W. GLITSCH & SONS, INC.
P. O. Box 6227
DALLAS 2, TEXAS

SALES OFFICES:
NEW YORK CHICAGO
CLEVELAND TULSA
HOUSTON LOS ANGELES

Comparison of methods . . . As a comparison of these various means of evaluating heats of condensations, Table 4 gives the computed heat removal in a reflux condenser on a demethanizer following an ethane pyrolysis unit. Tower top conditions are 500 psia. and —135° F., and the overhead gas contains over 60 per cent hydrogen. The differences are not too large by ordinary standards, but at such low temperatures refrigeration is costly and it may often be desirable to predict duties with more assurance.

TABLE 4—COMPARISONS OF HEAT BALANCES BY DIFFERENT METHODS

Method of computation—	Duty B.t.u./hr.
1. Enthalpy—Temperature Plot—Maxwell	5,000,000
2. Enthalpy of mixture at zero pressure corrected for pressure effect	5,300,000
3. Enthalpies of individual components evaluated at zero pressure, corrected for effect of pressure and then summed	5,650,000

Each of these methods in Table 4 requires either the assumption of ideal gas or of ideal solution behavior. None of these methods considers the effect of composition upon the enthalpy of a component in a mixture and there are many instances in practice where this effect must be serious. In general, if it is necessary to consider the effect of composition (or critical pressure) on the equilibrium constant K, it should also be necessary to consider the effect upon enthalpies or heats of solution. Dr. Otto Miller[24] was one of the first to demonstrate this by measuring experimentally the heat of solution of normal butane in a 145-mol. wt. paraffinic solvent as a function of butane concentration for temperatures from 150° to 350° F. and from 100 to 600 psi. For example, the heat of solution of butane at 300° F. and 400 psia. increased from by 30 per cent as the concentration of butane in the liquid increased from 10 to 25 mole per cent.

The A.P.I. Research Project No. 37 directed by Profs. B. H. Sage and W. N. Lacey is essentially the only source of partial heats of solution which are based upon experimental measurements. Table 5 lists some data taken from the work of Sage and Lacey. The values are the partial molal enthalpy, or the enthalpy of the component per unit at a constant composition pressure and temperature, in B.t.u. per pound relative to a standard state of absolute zero and 1 atm. pressure.

For the conditions cited, it will be noted that the heat of absorption of methane in pentane is not large but varies considerably. Similarly, the heat of vaporization of pentane into gaseous methane is large, but the quantity of pentane so involved is small. These saving facts are familiar to all designers of high-pressure absorbers. However, although the practical consequences may be rather unimportant in such a case, the data do illustrate the fact that the heat of absorption is drastically affected by the composition.

TABLE 5—PARTIAL ENTHALPIES, B.T.U./LB. MOLE FOR METHANE AND PENTANE AT 160° F. AND 2,000 PSI.

Component	Mole fraction	in	Phase	Partial enthalpy
Methane	0.5	Ethane	Gas	4,830
Methane	0.7	Ethane	Gas	4,500
Methane	0.9	Ethane	Gas	4,390
Methane	0.96	Ethane	Gas	4,370
Methane	0.96	Pentane	Gas	4,356
Methane	0.98	Pentane	Gas	4,370
Methane	0.1	Pentane	Liquid	4,053
Methane	0.3	Pentane	Liquid	4,025
Methane	0.5	Pentane	Liquid	4,659
Pentane	0.02	Methane	Gas	4,990
Pentane	0.04	Methane	Gas	5,700
Pentane	0.5	Methane	Liquid	2,166
Pentane	0.7	Methane	Liquid	3,176
Pentane	0.9	Methane	Liquid	2,838

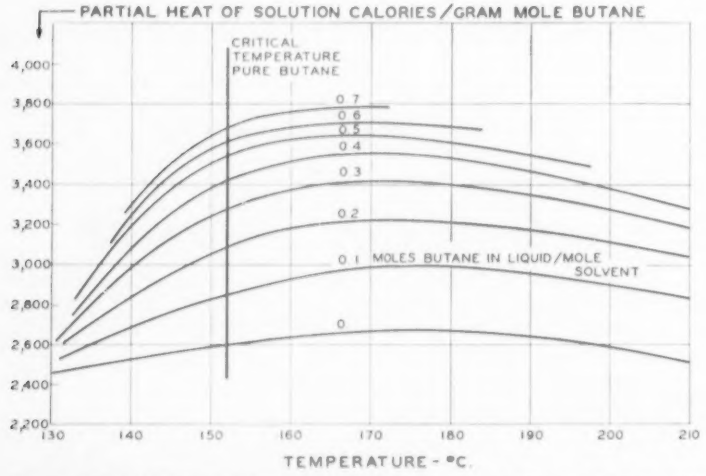


Fig. 7—Partial heat of solution of n-butane in 146 m.w. solvent at 400 psia. (Otto Miller).

Thermal Properties

Unfortunately, these thermodynamic data do not yet cover too many systems of interest in deep extraction, and a satisfactory correlation is not at hand which will be suitable for all specific mixtures.

Predictions of partial enthalpies . . . There is some hope of obtaining usable enthalpy data before good experimental data becomes available over a wider range of temperature and pressure. Canjar and Edmister[19] and more recently Papadopoulos, Pigford, and Friend[27] have utilized the Kellogg equation of state to compute partial enthalpies for the light hydrocarbons where experimental data are available for checking the calculated results appear valid. The procedure will be enthalpies as functions of pressure, temperature, and composition as well. However, the computations are long and complicated and it is interesting to note that the two sets of authors have obtained different numerical values by using different calculation methods based on the same equation of state. Table 6 shows the heat of vaporization calculated by the latter authors for ethane compared with the pure component. The Peters' correlation gives approximately a constant value which is independent of the composition in this range.

These data should indicate the need for extension of calorimetric studies, especially in the low-temperature region. It might be stated that our need for enthalpy data is an inverse function of the pressure or temperature of gas processing. It is almost satisfied at atmospheric temperature absorption at 2,000 psi. but the need for accurate data increases steadily as the processing temperature decreases. At subatmospheric temperatures the design of a system involves refrigeration equipment as well as heat exchangers. For example, if cooling water is used in a condenser then the factor of safety or of ignorance is applied primarily to the amount of exchanger surface. At a temperature below that of available cooling water the factor of safety must be applied to the refrigeration equipment as well as to the exchangers. Refrigeration is costly. To reach —150° F. by a cascade system of evaporative cooling with ethylene and propane require about 700 b.hp. per 1,000,000 B.t.u., a quantity seven times greater than necessary to furnish cooling at 30° F.

TABLE 6

Heat of Vaporization of Ethane at 500 Psia. Into Vapor of —200° F. Molal Average Boiling Point (M.a.b.p.)

		Heat of vaporization of ethane, B.t.u. per lb.		
		From mixture		Pure component at temp.
Temp. (°F.)	M.a.b.p. of liquid	Equation of state	Peters' corr.	
50	0	115	141	113
	180	85		
0	—60	115	142	154
	0	105		
	180	85		
—50	—60	130	143	180
	60	115		

Density, viscosity, and surface tension . . . Whenever the composition, temperature, and pressure are known, the density of a gaseous and liquid hydrocarbon systems may be calculated satisfactorily for the usual design problem.[47, 49] The viscosity of gaseous streams may be estimated from the molecular weight.[6] The viscosity of light hydrocarbon liquids may be estimated from pseudocritical temperature and pressure along with molecular weight.[5]

The surface tension of volatile hydrocarbon mixtures may become very low as the single-phase pressure is reached. Data on the methane-propane system have shown that surface tensions may be computed for these conditions.[46]

Conclusions

The need for equilibrium data in processing is at those pressures which approach the apparent convergence pressure for the mixtures under consideration. This condition arises primarily in low-temperature processing operations.

Similarly, enthalpy data are most uncertain at low temperatures where mixtures are in the critical pressure region.

References

1. Aroyan, H. J. and Katz, D. L., "Temperature Vapor-Liquid Equilibria in Hydrogen-n-Butane System," Ind. Eng. Chem., 43, 185 (1951).

2. Benedict, M., Webb, G. B., and Rubin, L. C., "An Empirical Equation for Thermodynamic Properties of Light Hydrocarbons and Their Mixtures," J. Chem. Phys., 8, 334-345 (1940).

3. Benedict, M., Webb, G. B., and Rubin, L. C., "An Empirical Equation for Thermodynamic Properties of Light Hydrocarbons and Their Mixtures," J. Chem. Phys., 10, 747-758 (1942).

4. Benedict, M., Webb, G. B., and Rubin, L. C., "An Empirical Equation for Thermodynamic Properties of Light Hydrocarbons and Their Mixtures," Chem. Eng. Progress. 47, 419-422, 449-454, 571-578. (1951).

5. Bicher, L. B. and Katz, D. L., "Viscosity of the Methane-Propane System," Ind. Eng. Chem., 35, 754 (1943).

6. Bicher, L. B. and Katz, D. L., "Viscosity of Natural Gases," Trans. AIMME, 155, 244 (1944 and 1945).

7. Brown, G. G. and Holcomb, D. E., "Vapor Liquid Phase Equilibria in Hydrocarbon Systems," Petrol. Engineer, 11, 55 (June 1940).

8. Brown, G. G. and Holcomb, D. E., "Thermodynamic Properties of Light Hydrocarbons," Ind. Eng. Chem., 34, 590 (1942).

9. Brown, G. G., "A Series of Enthalpy-entropy Charts for Natural Gases," 155, 314 (1944), Trans. A.I.M.E.

10. Canjar, L. N. and Edmister, W. C., Paper presented A.I.Ch.E., St. Louis, 1952.

11 Depriester, C. L., "Light Hydrocarbon Vapor-Liquid Distribution Coefficients. Pressure - Temperture - Composition Charts and Pressure - Temperature Nomographs," Presented at Cleveland meeting, A.I.Ch.E., December 1952.

12. Donnelly, H. G., "Two-Phase and Three-Phase Equilibria in the System Carbon Dioxide-Methane," Ph.D. Thesis, University of Michigan. Presented at Research Conference on Phase Equilibria at University of Michigan July 1 and 2, 1953.

13. Guter, M., Newitt, D. M. and Ruhemann, M., "Two-Phase Equilibrium in Binary and Ternary Systems," Proc. Roy. Soc. (London), 4176, 140-152 (1940).

14. Hadden, S. T., "Vapor-Liquid Equilibria in Hydrocarbon Systems," Chem. Eng. Prog., 44, 37-54, 135-156 (1948).

15. Hoffmann, H. E., Crump, J. S., and Hocott, C. R., "Equilibrium Constants for a Gas-Condensate System," Trans. A.I.M.E., 198 (1953).

16. Katz, D. L., "Application of Vaporization Equilibrium Constants to Production Engineering Problems," Trans., A.I.M.E., 127, 159 (1938).

17. Katz, D. L. and Hachmuth, K., "Vaporization Equilibrium Constants for a Crude Oil-Natural Gas System," Ind. Eng. Chem., 29, 1076 (1937).

18. Katz, D. L. and Rzasa, M. J., "Bibliography for Physical Behavior of Hydrocarbons Under Pressure and Related Phenomena," J. W. Edwards, Inc., Ann Arbor (1946).

19. Kay, W. B., "Liquid-Vapor Equilibrium Relations in Binary Systems," Ind. Eng. Chem., 32, 353-357 (1940).

20. Kellogg Equilibrium Charts, Chem. Eng. Prog., 47, 571 (1951).

21. King, J. J. and Mertz, R. V., "Hydrocarbon Extraction by Refrigeration," The Oil and Gas Journal, 50, No. 44, 95, (March 10, 1952).

22. Kirkbride, C. G. and Bertett., J. W., "High Pressure Absorption of Low-Boiling Hydrocarbons," Ind. Eng. Chem., 35, 1242 (1943).

23. Maxwell, J. B., Data Book on Hydrocarbons, D. Van Nostrand and Co., New York, 1950.

24. Miller, Otto, Ph.D. Thesis, University of Michigan, 1934.

25. Natural Gasoline Supply Men's Association. Engineering Data Book (1951).

26. Organick, E. I. and Brown, G. G., "Prediction of Hydrocarbon Vapor-Liquid Equilibria," Chem. Eng. Prog. Symposium Series, No. 2, Vol. 48 (1952).

27. Papadopoulos, A., Pigford, R. L. and Friend, L., "Partial Enthalpies of Light Hydrocarbons in Solution." Paper presented to A.I.Ch.E., Cleveland, 1952.

28. Perry, J. H. Chemical Engineers Handbook. McGraw Hill Book Company.

29. Peters, H. F., "Partial Enthalpies of Light Hydrocarbons," Pet. Refiner, 28, No. 5, 109 (1949).

30. Poettmann, F. H., "Vaporization Characteristics of Carbon Dioxide in a Natural Gas-Crude Oil System," Trans., A.I.M.E. 192, 141 (1951).

31. Poettman, F. H. and Katz, D. L., "Carbon Dioxide in a Natural Gas-Condensate System," Ind. Eng. Chem., 38, 530 (1946).

32. Poettmann, F. H. and Mayland, B. J., "Equilibrium Constants for High Boiling Hydrocarbon Fractions of Varying Characterization Factor," Petrol. Refiner, 28, 101, July 1949.

33. Roland, C. H., "Vapor-Liquid Equilibria for Natural Gas-Crude Oil Mixtures," Ind. Eng. Chem., 37, 930 (1945).

34. Roland, C. H., Smith, D. E., and Kaveler, K. H., "Equilibrium Constants for a Gas-Distillate System," The Oil and Gas Journal, 39, 128-132 (March 27, 1941).

35. Rzasa, M. J., "The Coexistence of Liquid and Vapor Phases at Pressures Above 10,000 Psi.," Trans. A.I.M.E., 189, 119, (1950).

36. Sage, B. H., "Status of Thermodynamics in the Petroleum Industry," Ind. Eng. Chem., 42, 631 (1950).

37. Sage, B. H. and Lacey, W. N., "Fundamentals of Hydrocarbon Behavior," Research Project 37 Fundamental Research on Occurrence and Recovery of Petroleum (1950-51).

38. Sage, B. H. and Lacey, W. N., "Thermodynamic Properties of the Lighter Paraffin Hydrocarbons and Nitrogen," Monograph on A.P.I. Research Project 37.

39. Solomon, E., "Liquid Equilibrium in Mixtures of Light Hydrocarbons and Absorber Oils," Chem. Eng. Prog. Symposium Series, No. 3, Vol. 48 (1952).

40. Souders, M., Selheimer, C. W., and Brown, G. G., "Equilibria Between Liquid and Vapor Solutions of Paraffin Hydrocarbons," Ind. Eng. Chem., 24, 517 (1932).

41. Standing, M. B. and Katz, D. L., "Density of Natural Gases," Trans. A.I.M.E., 146, 140 (1942).

42. Standing, M. B. and Katz, D. L., "Vapor-Liquid Equilibria of Natural Gas-Crude Oil Systems," Trans. A.I.M.E., 155, 230 (1944).

43. Stutzman, L. F. and Brown, G. M., "Low Temperature Vapor-Liquid Equilibria," Chem. Eng. Prog., 45, 139-147 (1949).

45. Webber, C. E., "Equilibrium Constants of Hydrocarbons in Absorption Oil," Trans. A.I.M.E., 142, 192 (1941).

46. Weinaug, C. and Katz, D. L., "Surface Tension of Methane-Propane Mixtures," Ind. Eng. Chem., 35, 239 (1943).

47. Winn, F. W., "Simplified Nomographic Presentation of Hydrocarbon Vapor-Liquid Equilibria," Chem. Eng. Prog. Symposium Series, No. 2, Vol. 48 (1952).

48. Williams, R. B. Ph.D. Thesis in Preparation.

49. Brown, G. G., Katz, D. L., Oberfell, G. G. and Alden, R. C., "Natural Gasoline and the Volatile Hydrocarbons," (1948).

50. Pratt, A. W. and Foskett, N. L., "Low Temperature Processing of Light Hydrocarbons," Trans. A.I.Ch.E., 42, 149 (1946).

BOOK

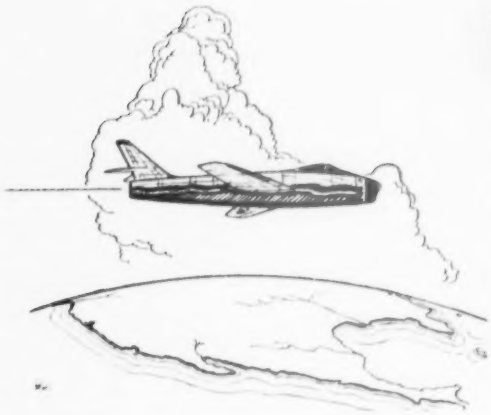
A.S.T.M. STANDARDS ON BITUMINOUS MATERIALS FOR HIGHWAY CONSTRUCTION, WATERPROOFING, AND ROOFING. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 436 pp. $3.50.

Included are 41 specifications and 58 methods of testing covering highway construction materials, waterproofing and roofing materials (such as asphalts, tar and coal-tar pitch, fabrics, felts, shingles, creosote, and many others), also viscosity by means of the Saybolt Viscosimeter, volume correction tables, etc.

GRAVER

CONSERVATION TANKS AVAILABLE

Coast to Coast

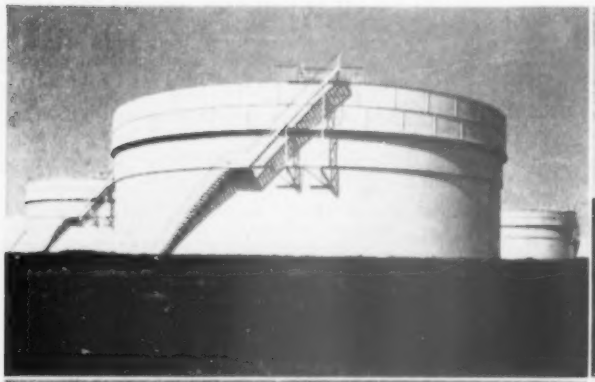


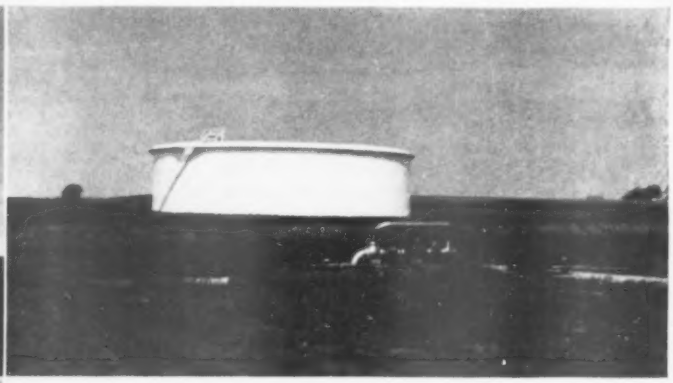
Graver has recently acquired additional facilities at Fontana, California, to serve as another important base for field erection of Graver Conservation Equipment. Now, throughout the country, Graver quality and service are almost literally "at your own back door."

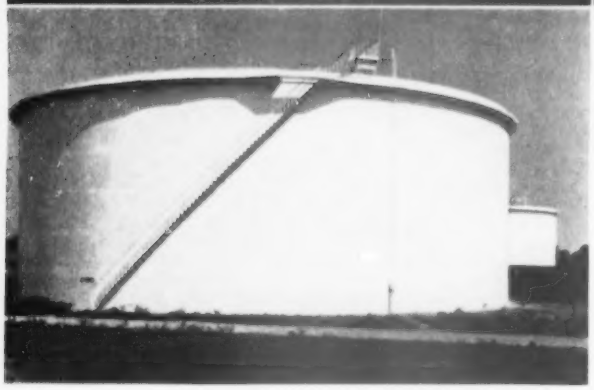
There is a Graver conservation design to suit *your* exact needs. And Graver sales engineers are as close as your telephone. Put our 97 years' experience to work for you!

***the* Graver Expansion Roof Tank** eliminates breathing losses and minimizes filling losses. Its positive liquid seal, exclusive with Graver, protects under all conditions. Ideal for converting existing tankage, and simple to maintain, the Expansion Roof Tank may well protect an entire terminal.

***the* Graver Center-Weighted Floating Roof Tank** combines the economy of the pan-type roof with the stability of the double-deck floating roof. Built to principles of ship design, the roof is stable and will neither sink nor tilt. The entire deck is completely accessible for inspection.



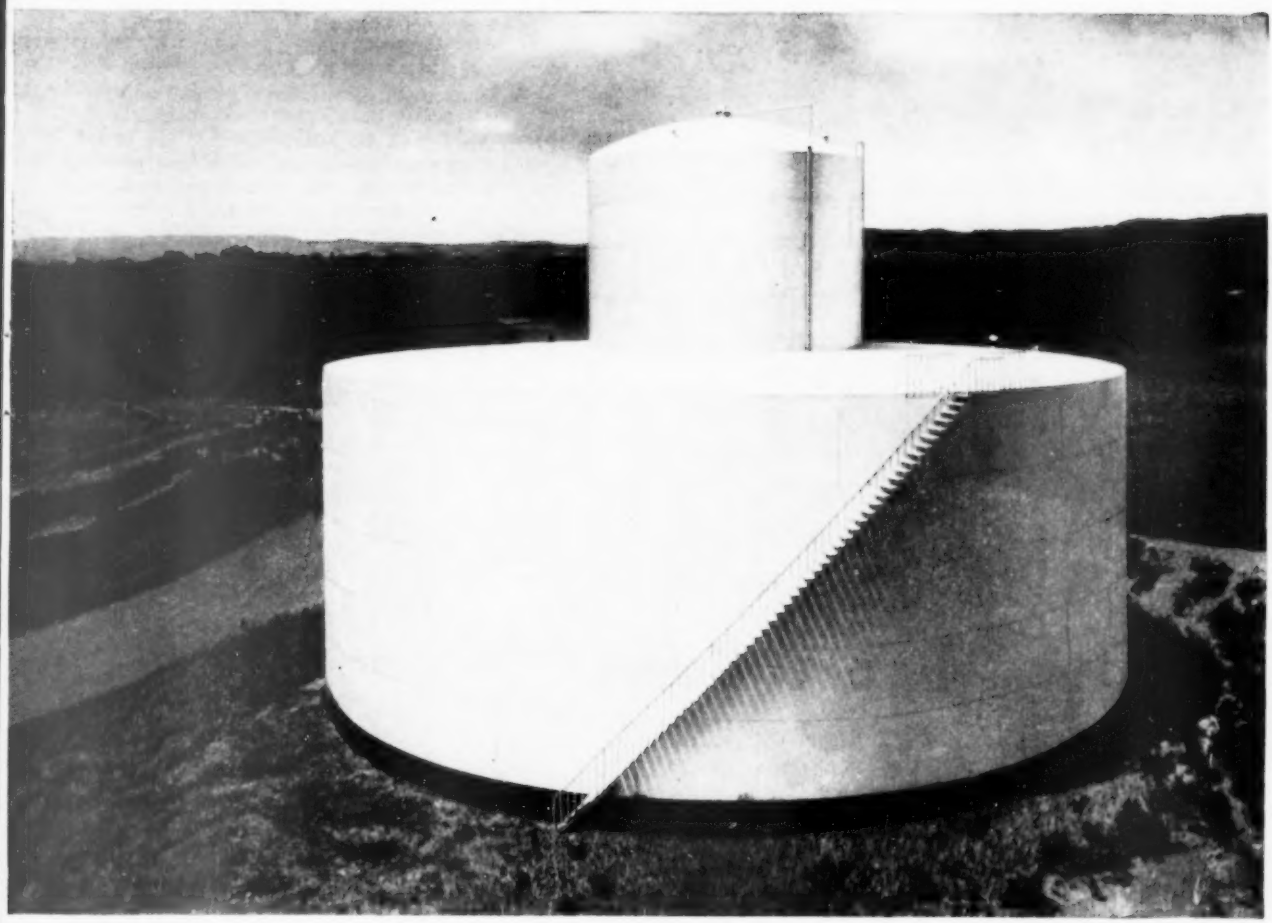




***the* Graver Double-Deck Floating Roof Tank** floats directly on the liquid, preventing the formation of vapors. It is applicable alike to crude and product storage areas at refineries, pipeline terminals and large bulk installations.

GRAVER

CONSERVATION TANKS

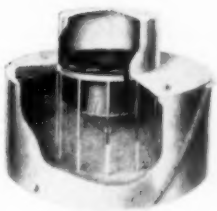


the thriftty VAPOR-MIZER

This revolutionary conservation design warrants your attention! The Vapor-Mizer not only uses less steel in building, but requires smaller, less expensive vapor lines in manifolded tankage.

With the Vapor-Mizer, standing losses are eliminated and filling losses are very much reduced...in addition, the fresh quality of your product is maintained.

The Vapor-Mizer is readily adaptable to converting existing tankage into fully effective conservation units. And since it operates at very low pressures (less than one ounce), the reinforcement of manifolded tanks becomes unnecessary. Look into the many economies offered by the Graver Vapor-Mizer!



THE VAPOR-MIZER

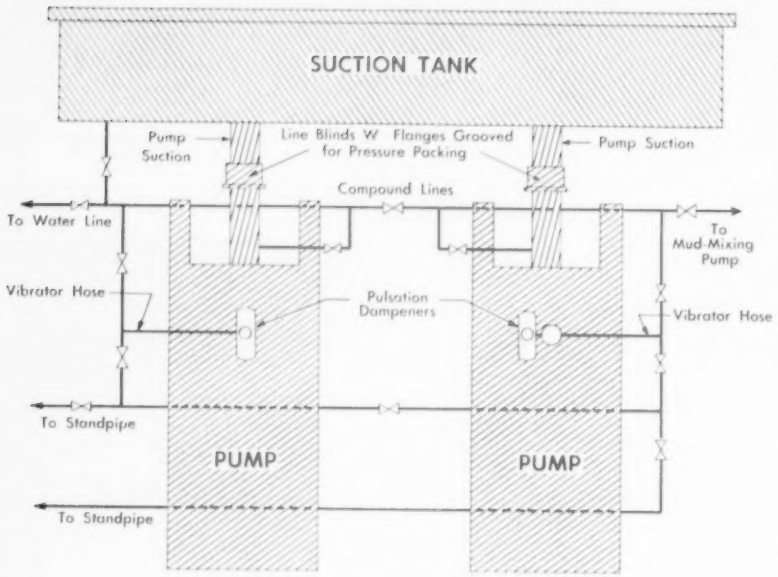
- Eliminates standing losses... minimizes filling losses
- Requires less steel to build
- Readily converts older, existing tankage

GRAVER TANK & MFG. CO., INC.

East Chicago, Indiana

New York • Chicago • Philadelphia • Atlanta • Detroit • Cleveland
Pittsburgh • Houston • Catasauqua, Pa. • Sand Springs, Okla.
Odessa, Texas • Casper, Wyo. • Los Angeles

You are cordially invited to visit us at SUITE 1700, Conrad Hilton Hotel—Chicago, November 9 through 12.



Compounding of power pumps is illustrated here.

Application of Power Pumps To High Pressure for Jet-Bit Drilling

by R. J. Meers

EFFECT on penetration rate in drilling by the application of increased horsepower at the bit has been shown rather conclusively in numerous technical papers on the subject of hydraulics and jet bit performance. A careful study of the published literature will reveal that many drilling rigs are incapable of meeting the optimum hydraulic requirements of jet bits with conventional utilization of the rig pumps. Recognition of this condition has resulted in the installation of larger power pumps capable of developing 600 to 750 hydraulic horsepower on several rigs throughout the country.

Although it has been demonstrated[1] that the use of such pumps is economically feasible, the lack of flexibility where low volume circulation rates are required together with investment, maintenance, and moving costs indicates the need for a more desirable alternative approach to the problem. In order to utilize the maximum horsepower from available rig pumps, one operator[2] started, approximately 2 years ago, the use of two power pumps connected in series. It is the purpose of this paper to show data resulting from compound power pump application and point to the possible advantages which may be realized.

One A.P.I. bit questionnaire form presents a typical example of two 400 horsepower pumps being operated in series. It is significant to note that an average of 678 hydraulic horsepower was maintained in drilling to 10,000 ft., with a maximum of 750 hydraulic horsepower having been developed. Pumping pressures, with the pumps compounded, ranged from 1,350 psi. to 2,000 psi., with pump liner size having remained unchanged.

In a typical application of a pump in the 700 horsepower class, this pump, as applied, developed an average of 519 horsepower in drilling to 9,228 ft., where the use of jet bits was discontinued. That a higher hydraulic horsepower average was not maintained is due to the sharp increase in pump costs and repair time experienced while operating at pressures above 1,600 psi. It appears that 1,800 psi. may be the maximum economical operating pressure for this pump regardless of the volume pumped due to the excessive wear on valves and pistons. Although tests have been conducted with various manufacturers' valves, the results are as yet inconclusive.

It has long been thought that successful compounding of power pumps would require the use of a flexible pump drive such as a fluid coupling, torque converter, or electric motor. At least 7 drilling rigs utilizing compound power pump application are now being operated in the Gulf Coast region without the use of any of these methods of power transmission. The minimum equipment necessary to compound power pumps is pulsation dampeners, vibrator hoses, and suction line valves or line-blinds designed to meet the high pressure requirements.

A pulsation dampener should be located on the discharge of each pump. It has been determined that a more satisfactory dampening effect is obtainable with two dampeners of the type selected installed on the discharge of the No. 1 pump. With the pulsation dampeners charged with 750 psi. gas pressure an excessive number of leaks and diaphragm failure were experienced. With the charge pressure reduced to 500 psi., dampener failures were practically eliminated without decreasing the effectiveness to a critical point.

Prior to the installation of vibrator hoses, mud line failures were experienced due to vibration. These failures occurred most frequently at the point of connecting the discharge line from the No. 1 pump to the suction line of the No. 2 pump. In addition to the absorption of vibration from the mud lines, vibrator hoses also improve the flexibility of the pump installation which may reduce rig-up time.

Suction line blinds or valves having raised face flanges will not withstand the pressures associated with compound pump application. It is important that the design of this part of the system meet the maximum pressure which will be developed by the No. 1 pump.

The accompanying drawing is submitted to show pumps so piped to permit parallel, compound, or single pump application. Particular attention must be given to the ability of the pump piping to work at higher pressures than may be developed in parallel or single pump application. To keep friction losses through this part of the circulating system at a minimum, long radius tube turns, long sweep tees,

Author is with Loffland Brothers Co., Tulsa. Paper presented at thirteenth annual meeting of the American Association of Oilwell Drilling Contractors, Denver, October 4-6.

3½-in. I.D. high pressure vibrating hose with 4-in. connections, and full opening mud line valves are recommended. Shear relief valves are not shown in the drawing, but are, of course, very necessary to any type of power pump application.

The technique of placing power pumps in compound operation may be varied. Either pump may be started first, but it is desirable to start the pumps in quick succession to avoid overloading the No. 1 pump or allowing the No. 2 pump to run dry. Once the pumps are in operation both prime movers may be brought up to speed to obtain the desired balance in hydraulic horsepower being developed by each pump. Obviously, the No. 1 pump must discharge the same volume of fluid as that being discharged by the No. 2 pump. Due to the difference in volumetric efficiency, the No. 1 pump must operate at a higher speed than the No. 2 pump assuming identical pumps fitted with the same liner size. This has successfully been accomplished by throttling both prime movers to obtain optimum pumping conditions. Where gas engines are used, the engine vacuum may be used as a guide in obtaining a balance in horsepower.

Since equal volumes must be handled both pumps in compound application, it is possible to compound any two pumps provided this condition is accomplished through proper liner selection and speed control. The other limitations are that the discharge pressure should not exceed the manufacturer's recommendation on the No. 1 pump, nor should the differential pressure across the No. 2 pump exceed its pressure capacity.

Example . . . A 16-in. pump fitted with 6¼-in. liners delivering 7.82 gal. per stroke was used as the No. 2 pump in series with a 12-in. triplex pump fitted with two 6-in. and one 5-in. liner. The No. 2 pump was operating at 62 s.p.m. while the No. 1 pump was operated at 60 s.p.m. Under these operating conditions, 1,500-psi. discharge pressure was realized.

With a maximum pressure rating of 1,000 and 1,400 psi. respectively on the No. 1 and No. 2 pumps, 550 g.p.m. and pressures increasing to 1,800 psi. might be realized with optimum speed control of both pumps without operating either pump beyond its capacity. Under these assumed conditions, approximately 575 hydraulic horsepower might be developed which compares with the performance of the 700-hp. pump cited in this paper.

Conclusions

After 2 years experience, one operator has proven that power pumps may be compounded successfully to meet jet bit requirements. The pressure-volume relationship of many pumps is such that jet bit drilling may be practiced through parallel application at shallow depths and compound application at greater depths with the maximum depth depending upon drill pipe size, hole size and bit nozzle area.

Pump repair and maintenance costs may vary as widely as operating pressures and mud properties vary. During a 6 months period in 1952 the average daily pump cost for operating a 700 horsepower pump was $46.22. This compares with a daily average cost of $48.00 where two 425 horsepower pumps were operated in parallel at slightly lower pressures.

Twelve month cost data on two pumps operated in series was $58.40 per day. Since this minimum cost data is inconclusive, further study will be required to determine the economic aspects of the problem.

There is one serious disadvantage to compound pump application. A pump failure requires an almost complete shut-down while repairs are being made. Although partial circulation may be maintained by bypassing part of the mud to the pits through one or more mud guns, the high velocity flow will cut out mud gun chokes.

A practical solution to this problem would be the utilization of a third pump as a stand-by or mud mixing pump which could be operated in series with the remaining pump. This would require three identical pumps in order that the proper pressure-volume condition would prevail at the time of pump failure.

Another solution might be the installation of 2 to 1 reduction gear drives on both pumps so that one pump could be operated at ½ speed while the second pump is undergoing repairs.

The writer does not intend to propose that the compound application of power pumps is practical under all types of drilling conditions, or for all drilling rigs. The data presented and the general discussion is only meant to show that more careful attention given to the hydraulic system[3] may point the way to improved rig performance through more complete utilization of existing equipment.

Bibliography

1. Hellums, Earle C., "Performance of Power Pumps in the 700 Horsepower Class," The Drilling Contractor, February, 1953.
2. Pennington, Thomas, "Operation of Power Slush Pumps in Compound," paper presented at twelfth annual meeting, American Association of Oilwell Drilling Contractors, Oklahoma City, Okla., September 28-30, 1952. Discussion of Earle Hellum's paper cited above.
3. Thompson, Gene D., "Practical Application of Fluid Hydraulics to Drilling in California," The Oil and Gas Journal, July 20, 1953, Vol. 52, No. 11, p. 105.

NEW! More Resilient!
LUBRICATED
TEFLON
IMPREGNATED ASBESTOS
PACKING

The Perfect Seal
Against Acids, Alkali, Solvents!

HOT — COLD — CONCENTRATED — DILUTED
TEMPERATURES FROM −150° F. TO +500° F.

Specify Style No. 401 for everything but molten alkali metals, fluorine, hot phosphoric acid and hydrofluoric acid. (Specify Style No. 402 Lubricated Teflon Blue Asbestos Packing without glass fiber core for hot phosphoric acid and hydrofluoric acid).

When Teflon Packings fail it can only be due to
(1) Lack of resiliency
(2) Lack of lubrication
(3) Cold flow
(4) Expansion

Flexrock has licked them all with Style #401. Don't count Teflon out until you've tried it — at our expense — wherever Teflon Packings have failed in the past.

We'll gladly send you literature but you can't pack valves or pumps handling hard-to-hold acids, alkali, or solvents with a catalog — only #401 itself will do the job.

Use the coupon to order 10 ft. of any size (made 1/16 inch to 1 inch in gradations of 1/16 of an inch) and if it doesn't work to your satisfaction we'll cancel the invoice. You'll be surprised at its first cost — it's considerably lower than any other Teflon Impregnated Packing on the market.

MECHANICAL PACKING DIVISION
FLEXROCK Company
3611 Filbert St., Phila. 1, Pa.

Mechanical Packing Division
FLEXROCK COMPANY
3602-X Filbert Street, Philadelphia 1, Pa.
☐ Please send further information.
☐ Ship 10 ft. length ☐ #401 or ☐ #402
size ..... on memo invoice.
Name .....
Company .....
Address .....
City ..... Zone ..... State .....
Please clip coupon to Company letterhead

CORROSION CATECHISM

Systematic Approach to Corrosion Mitigation

. . . in 10 questions and their answers

by Marshall E. Parker

MITIGATION of corrosion is an engineering problem. In reaching a solution for a given case, there are a number of successive decisions and choices which are to be made. Each one, when decided, limits the field of possibilities involved in the next step. If these questions are faced in the proper order, a systematic solution can be found with a minimum of effort. The discussion here will be limited to corrosion involving buried structures of metal, of which pipe lines form a prime example.

Question No. 1 . . . Is the structure subject to corrosion? Obviously, if the answer is no, then we are through with our problem at this stage. If it is yes, then we must take up the question of degree. Any structure of metal buried in the soil or immersed in water, is subject to some corrosion. The coatings which we customarily apply to protect the things we build are of considerable assistance in resisting corrosion forces; but it cannot be assumed that a coating can be applied which will completely protect the surface of the metal from any contact with the soil or water. The answer to our first question must be yes, in almost every possible case which can arise.

Question No. 2 . . . Is the corrosion serious enough to constitute a problem? This is a question to which a surprising number of people give the wrong answer. At the one extreme, we have a pipe line which is worrying its owners by the amount of trouble they are having, patching leaks, paying damages, and trying to keep the line in operation. On the other hand, there are lines whose leak rates have developed gradually down through the years. The size of the maintenance force has kept pace with the leak rate, and it is a routine matter to go out and repair each leak as it is reported. Top management may not even be aware that leaks are being experienced, or that there is anything at all amiss. And yet the company may be spending, on the repair of leaks, ten times what it would cost to control them! This is not exaggeration—such cases exist.

Author is corrosion consultant, Houston.

Again, in the case of a new line or one still in the planning stage, many vital decisions must be made. There are right-of-way problems, there are questions of construction details, of oil or gas supply to feed the line, of financing, of taxes, of regulations to be complied with—all of these are pressing problems, demanding immediate attention. Corrosion, at this stage, is not a pressing problem. Nature, however, is waiting quietly, patiently, to begin her work of attacking the structure, once it is in the ground.

There are, of course, many structures on which the attack of corrosion is not serious enough to constitute a problem. In these instances, repairs, as needed, may well be the most economical way to cope with the attack which is encountered. But it is seldom safe to assume that a given structure falls within this class, without an expert investigation of the situation. Where the structure involved is one already built, this investigation will take the form of a "corrosion survey" —which includes (1) a study of leak records, (2) an investigation of the environment in which the structure lies, and (3) electrical measurements on the structure itself.

If the structure has not been built, but is in the planning stage, such a study is even more important. Whatever may be the specific findings of such a preliminary investigation, the odds are overwhelming that the final net cost of maintaining the system will be lower because of the foresight made possible—it is never too early to start fighting corrosion!

Question No. 3 . . . Can cathodic protection help? One of the possible solutions — or partial solutions — to the problem is the application of cathodic protection. The data gathered in the corrosion survey, usually suffice to afford the answer to this question also. Often, of course, only a tentative answer can be given at this stage; a partial design may have to be worked out before costs can be evaluated. What is actually meant by the question "Can cathodic protection help?" is "Will cathodic protection save more than its cost?" Surprisingly enough, this question can usually be answered without a field investigation, although numerical results cannot be had so simply. If the corrosion is severe enough to be a problem, then almost without exception, some degree of cathodic protection will result in a saving.

Cathodic protection can help in ways other than those which reduce the incidence of corrosion. It can make possible a lower cost construction without an increase in corrosive attack. It can, in many instances, make possible the use of a material other than that originally contemplated. For example, the destructive activity of marine organisms on wood piling can be averted by the use of steel; the effective and economical use of steel in salt water, however, is made possible by the use of cathodic protection. This technique, then, although primarily a weapon against corrosion, can be applied in such a way as to effect a solution of a basically different problem.

Question No. 4 . . . What steps are necessary or advisable in conjunction with cathodic protection? Affirmative answers to the first three questions now begin to bring us down to the level of specific decisions. When a structure is to be cathodically protected, it is proper to limit the protective current, insofar as it is practical to do so, to the structure under consideration. One does not want to spend money in the unnecessary protection of structures belonging to others, or of structures of less value than the one in question.

On the other hand, it is our duty to see to it that our protective system does not inflict damage upon other structures. We have three basic problems in this regard: isolation, integration, and bonding. The structure must be isolated electrically from all others whose protection is not contemplated under the project; this can be accomplished by the installation of equipment and materials which are available in adequate variety. The structure must also be integrated into a single electrical unit; this will require the installation of short-circuiting bonds around any nonconductive joints which may be present.

Bonding, in the sense of establishing electrical connection between the protected structure and others lying near-

by, is a means of preventing damage to the others. Ordinarily, it consists of the installation of connections including adjustable resistances, so that just enough current is drained from the threatened structure to overcome the hazardous exposure. Often this does require the furnishing of appreciable amounts of protection to others; it may even exceed that furnished to the protected structure itself in some cases. It is, however, an inescapable responsibility of the engineer designing a cathodic protection system to take such steps as may be required to prevent such damage.

Other steps which may be advisable in connection with the installation of a protective system range from the installation of test leads to, in extreme cases, a recommended complete reconditioning of a pipe line. Careful investigation must always be made before such a program is followed; it is quite possible that the cathodic protection of even a very poorly coated line in bad condition may be less expensive than reconditioning.

Question No. 5 . . . How much current is required? The amount of current required for the cathodic protection of a given structure depends upon the environment to which it is exposed, upon the amount of the structure which is actually exposed, upon the uniformity with which we are able to distribute the current, and upon the degree of protection which is desired. Bare steel in 1,000 ohm-cm. soil requires approximately 1 ma. per square foot for its protection. The current required doubles if the resistivity is reduced tenfold. This relationship can be tabulated as follows:

10,000 ohm-cm.	0.5 ma.
1,000 ohm-cm.	1 ma.
100 ohm-cm.	2 ma.
10 ohm-cm.	4 ma.

An equation can be written to express the same function:

$$i\,(\text{current density}) = 2^{x}$$

where:

$$x = 3 - \log \rho$$

The current requirement of a coated structure, however, is profoundly influenced by the coating; i.e., by the amount of the surface which is actually in contact with the environment. Instead of attempting to measure this quantity, and then to apply the above requirement, it is far simpler to determine the current demands of the structure directly by test. Such a test consists of placing the structure under cathodic protection, or partly so, by the use of some temporary source of power, and observing its response to a given amount of current. There are many different techniques useful in this test, and the choice must be made in terms of the actual problem encountered.

It must be remembered that it is not necessary to know the exact answer to this question in order to proceed. If we need to know our costs, however, we must know at least an approximate answer. Often, though, there is no question as to the advisability of applying cathodic protection, and the installation can be made piecemeal, and cut to fit in the field. Rectifiers can be adjusted; in fact, it is the rule rather than the exception to adjust them after installation. Magnesium anodes can be varied both in quantity and in distribution; most of such installations are varied from the original plan as the installation proceeds.

The estimate of current requirement, to whatever degree of accuracy may be required, is made either by comparison of the structure with others in the experience of the engineer, or by actual field test. Either of these methods will give some idea of the total current required. Neither of them can be depended upon to give the exact value.

Question No. 6 . . . Which system of cathodic protection is the better? The two basic systems which must be compared here are those which employ distributed (or grouped) galvanic anodes, usually magnesium, on the one hand; and rectifiers with anode beds on the other. Many factors enter into the choice between these two; often, however, the choice is easy, as one or the other has outstanding advantages.

Magnesium anodes are virtually ruled out in situations where the soil resistivity is high. Above 3,000 ohm-cm. the current output is so low that they are rarely usable. The corrosion engineer's dilemma in this case is not nearly so severe now as it has been in times past. Power lines are much more widely distributed than was formerly the case, and rarely is power accessibility an extreme problem. Where the soil resistivity is high, then, the choice is almost invariably for rectifiers.

In city networks, on the other hand, or in other instances where the protected piping is intricately interwoven with many crossing lines, the use of rectifiers is accompanied by a complex interference problem. Magnesium anodes, on the other hand, can be installed in small units, quite close to the protected lines, and there will rarely be any difficulty with interference. So it is that in a complex network, unless the resistivity is prohibitively high, the choice will usually be magnesium.

Cases which are not so straightforward must be decided by a careful consideration of the advantages of each system. In general, they are as follows:

Magnesium: (1) because of better current distribution from a large number of small drainage points, the total current required will usually be less; (2) their use is independent of outside power sources; (3) they can be distributed flexibly along the line, concentrated where needed most and spread thinly elsewhere; (4) as mentioned above, interference is usually far less; (5) current output can be increased by the addition of more anodes, if need increases.

Rectifiers: (1) total initial cost is usually less; (2) with only a small number of drainage points, inspection and supervision are simpler; (3) current output can be adjusted in either direction, within limits, to care for seasonal variations; (4) they can be used in any soil.

So far in the discussion, each question has led directly to the next; with the answer to this one, however, we must follow one or the other of two paths, depending upon our choice of a basic system. The remaining sets of four questions each—one for each type—will be treated but briefly; the actual complete solutions cover a very considerable range of design. The questions for the magnesium-anode-type system will be taken first.

Question No. 7 (M) . . . How shall the drainage points be distributed over the structure? The absolute maximum economy of current would require the use of single anodes spaced along the line. If there is any kind of coating at all on the line, however, anodes can be grouped with considerable economy of installation costs. With excellent coating, groups may be as far as 20 miles apart; with poor coating, half a mile, or even less, may be required.

The distribution will depend largely upon the distribution of low-resistivity soil; this indicates the areas of maximum current need, and also of maximum anode performance. The actual solution of the distribution problem is best accomplished in the field, and for its rapid solution, there is no substitute for experience.

Question No. 8 (M) . . . What size anodes should be used, and for what life should they be adjusted? These questions are usually decided largely by the soil resistivity encountered. It is usually economical to install, on a given project, anodes of sizes varying from 50 lb. down to 9 lb., as determined by the soil; this presupposes an organization which will not be embarrassed by a leftover supply of

anodes in some sizes. If the material must be specifically ordered for the job, the soil resistivity must be known, and even then there will probably be some anodes installed of the size other than the best suited for the location.

Anode life, of course, is a function of the size and of the current output. In general, it is well to aim at a 10-year life for all anodes on a given project. Some will inevitably extend over this limit, but none should be permitted to go below it. In some cases, an entire project is designed for 15-year life, but the initial investment required is high. In special cases, much shorter life is justified. For example, sea-water installations are ordinarily designed for 2 or 3-year life, taking advantage of the very low resistivity available. Ten years, for pipe-line projects, is a good general value.

Question No. 9 (M) . . . What installation features are desirable? The question here refers to the mechanical features of the installation. As a minimum: (1) all anode locations should be marked or recorded, (2) shunts should be installed for the measurement of current output, (3) resistors should be used to control current, in order to obtain uniform life expectancy, (4) all joints should be soldered (silver solder preferred) since mechanical joints are not reliable, and (5) wires should be trenched deep enough for adequate protection. Going beyond these minimum requirements, it is possible to devise very elaborate and expensive housings, terminal boards, and the like. In some few cases these may be justified, but ordinarily they are mere added expense.

Question No. 10 (M) . . . What is the recommended inspection and maintenance program? Unless the structure protected is of very minor importance, the installation should be inspected at least once a year. Potentials should be checked at a sufficient number of points to assure full protection, and current output should be checked on all stations (except very remote or inaccessible ones). Ordinarily, it is recommended that the system be partially inspected at more frequent intervals. Some few points, not too difficult of access, may be checked monthly or oftener. Then, if any difficulty is indicated, a search can be made for it before much protection is lost. Toward the anticipated end of the system life, plans should be made for the renewal of the installation at convenient working times. New anodes may be installed close alongside the old, and the same shunts, pipe connections, and markers used. The old anodes do not have to be disconnected until they are entirely consumed.

Question No. 7 (R) . . . How many units are to be used and at what spacing? The answer to this will be influenced by the availability of power. Lines can be built to bring power in to the desired locations, but this is an expense which should be avoided unless the advantages are great. In general, a large number of small units will protect a line at lower operating cost, while a few large units will require a smaller initial investment. These two elements of cost have to be balanced in order to obtain the combination which will result in the lowest total cost. The voltage rating of a given unit, after the size (in amperes) has been determined, will depend upon the resistance of the ground bed. This requires balancing the cost of a large ground bed (high first cost) against that of a high-voltage rectifier (high operating cost). The soil resistivity is influential in the decision.

Some operators favor the use of a single rating rectifier for all of the installations on a line, or within a division, in the interests of uniformity, spare-parts inventory, and the like. At the other extreme, some prefer to select each rectifier to fit its particular duty as closely as possible. There is no hard and fast rule in this regard.

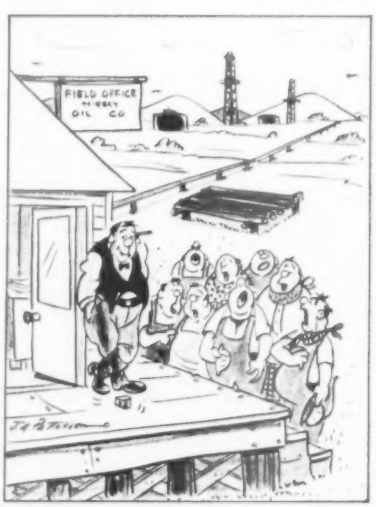
Question No. 8 (R) . . . What type and size of anodes should be used? Junk pipe anodes are not so commonly used now as formerly, for two reasons: (1) junk steel is too expensive, and (2) pipe-line companies do not have the quantities of junk pipe on hand that they did during the precathodic-protection days. There is a strong trend now to standardize on the graphite anode, and, of the various sizes available, there seems to be a tendency to standardize on the 3 by 60-in. There is no such trend toward standardization of the backfill quantity. These anodes are installed in as little as 8 ft. of backfill in an 8-in. hole, up to 20 ft. of backfill in an 18-in. hole. When properly compacted, the larger quantities are probably fully justified, since it is ultimately the backfill which forms the true anode.

The number and spacing of anodes depend upon the soil resistivity and upon the cost of power. An extensive bed requires little power (and a low-voltage rectifier) but is obviously more expensive. As a rule of thumb, a resistance of from 0.5 ohm to 1.0 ohm for the total ground bed will usually result in an economical installation. Some operators prefer to complete the ground bed and measure its loop resistance to the protected structure before selecting the rectifier; in this way there is assurance of obtaining a workable combination, though not necessarily the most efficient.

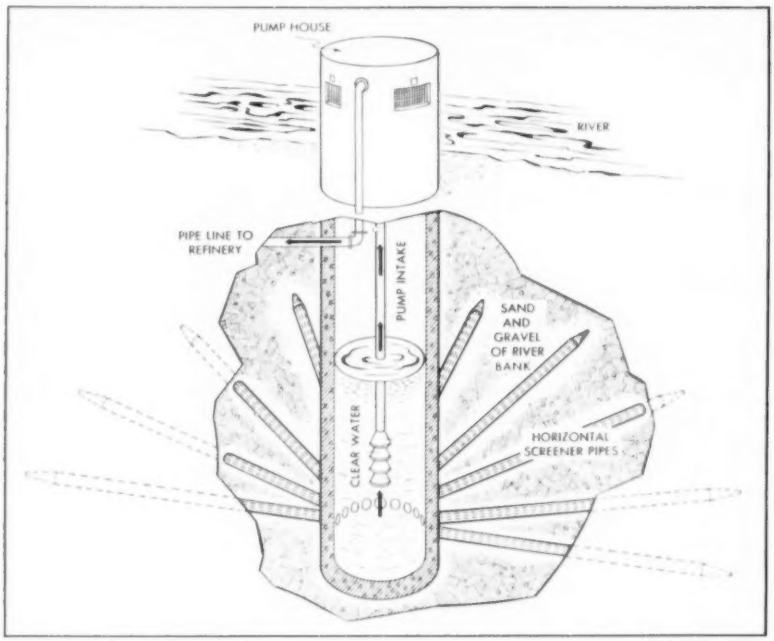
Question No. 9 (R) . . . What installation features are desirable? Here again, the reference is to the mechanical details of the installation. The following checklist is useful: (1) all buried splices, particularly on the anode lead, must be very thoroughly insulated and moisture-proofed, (2) consideration should be given to placing the anode lead aboveground, (3) cables, if buried, should be protected against accidental damage, (4) the arc of hazard of an accidentally severed cable must be provided for, if the location is hazardous; (5) power wiring should all be enclosed in conduit; (6) instruments should be totally enclosed, to avert malicious damage, and (7) rectifier cases should be provided with locks, and kept locked, to prevent tampering.

Question No. 10 (R) . . . What is the recommended inspection and maintenance program? The operation of the unit itself should be under very close observation. Instruments, including the watt-hour meter, should be read at least weekly. Plotting of the values read is very helpful in indicating trends, either seasonal or progressive. Pipe-to-soil potentials should be read at frequent intervals at a selected set of points, so chosen that any failure will result in a loss of potential at the monitor points. Permanently installed meters and reference electrodes are useful.

Rectifier should be given periodic inspection and maintenance; oil level should be checked, screens cleaned, cases painted, and connections tightened as needed.



"Happy birthday to you-u-u! Happy birthday to you-u-u!"



METHOD OF CONSTRUCTION of Ranney well to furnish additional 7,500 g.p.m. of water to the Shell Oil Co. Wood River, Ill., refinery.

"Horizontal well" taps water From Mississippi for Shell plant

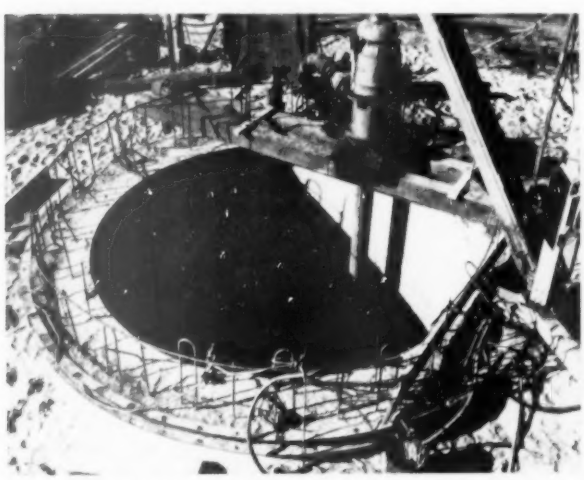
IN order to avoid lowering of the normal water table in the vicinity, engineers of Shell Oil Co.'s Wood River, Ill., refinery decided to put in a water well with horizontal branches to obtain water from the Mississippi River coming through the overlying sand and gravel of the river bank. This will add some 7,500 g.p.m. to the refinery's present water supply.

Although the Wood River refinery, in common with other refineries, uses its water over and over again, it still takes nearly 2 bbl. of water for every barrel of crude oil processed. The refinery presently draws some 7,000 g.p.m. of water from 27 conventional vertical wells drilled on Shell property. The present expansion program at the refinery is adding thousands of barrels to the daily crude-oil throughput capacity. This created the problem of additional water supply.

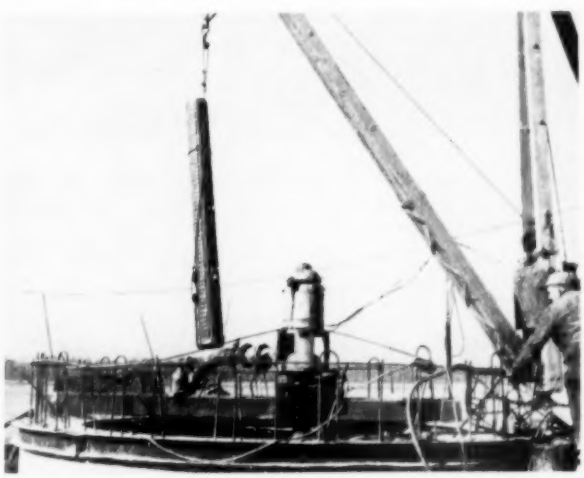
Water could have been taken directly from the Mississippi except for the fact that river water is loaded with tons of silt and debris. The solution was to drill a well close to the river and approximately 2 miles from the refinery. The well is being drilled straight down into the ground, with horizontal branches into the river bank. The water so obtained will have been filtered through the overlying sand and gravel. Since the river water is softer than ground water obtained from conventional vertical wells, minimum chemical treatment will be required.

The shaft or caisson of the Ranney well is sunk in sections down through the water-bearing strata and sealed off at the bottom with a heavy, reinforced-concrete plug. This shaft is 13 ft. inside diameter and 112 ft. deep with reinforced concrete walls 18 in. thick. Near the bottom of the shaft are located nine horizontal perforated collector pipes. These vary in length from 104 to 176 ft. Some reach out toward the river bank while others are parallel with it. Water coming through the collector or screener pipes, will enter the central well from which it can be pumped through a 20-in. pipe line to the refinery.

Present plans call for the pumping to be done by three vertical pumps



CENTRAL WELL is vertical reinforced-concrete shaft. Water will be collected through horizontal perforated branch pipes.



PERFORATED COLLECTOR OR STRAINER PIPE is shown here being lowered into vertical shaft.

located in a pump house aboveground to deliver a total of 7,500 g.p.m. The capacity of the well could be increased simply by adding another pump.

The well is being constructed by Ranney method Water Supplies, Inc., of Columbus, Ohio, which holds patents on the design.

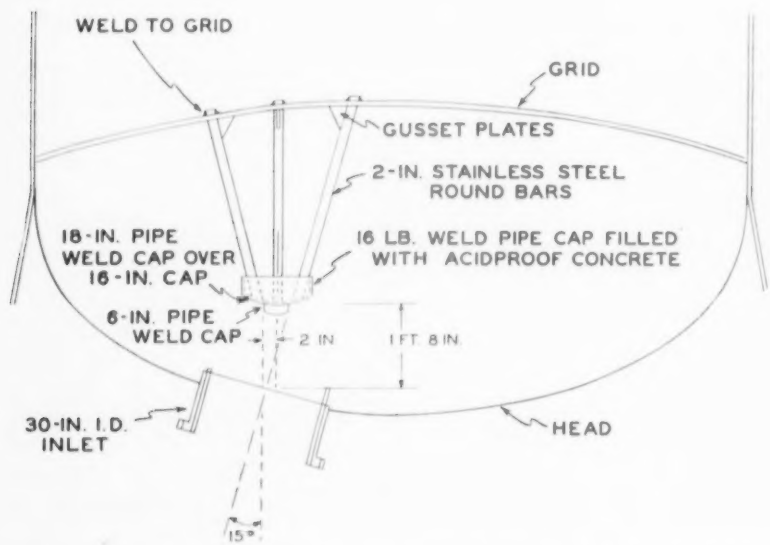
How N.C.R.A. arrested reactor grid erosion on fluid cat cracker

INTERIOR inspection of the reactor chamber on the fluid cat cracker by engineers of National Cooperative Refinery Association, at McPherson, Kans., revealed that the impact of the catalyst against the perforated grid resulted in considerable damage to the metal adjacent to the perforations. The consensus of the inspectors was, "Protect the grid immediately from further damage, or replace the entire sheet." But how was that to be done? The answer that came up was "Design and install a reactor riser target."

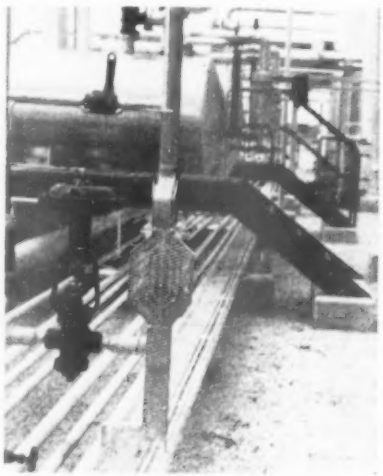
To break the flow of the fine material so that the impact might be reduced, a target was designed with a 16-in. weld pipe cap to break up the flow. The cap was supported by three 2-in. stainless-steel round bars, approximately 4 ft. in length, welded to the under side of the grid in the form of an inverted tripod. The base of this tripod (the upper end in this case) was constructed with the bars spaced at 27½-in. centers and reinforced with gusset plates. The apex of the tripod (the lower end) fitted snugly into the cup of the weld pipe cap and welded firmly in position. The comparatively flat cone of the welding cap was located 20 in. above the horizontal line bisecting the center line of the catalyst riser.

Since the target was experimental, it remained in service approximately 7 months, when a turnaround was due. Inspection revealed that the idea was a good one, but required modification. Therefore, an 18-in. pipe weld cap was fitted over the original 16-in. cap, and a 6-in. cap tack-welded onto the center of the new 18-in. cap, thus making a setting of three caps of different diameters. The annular space between the 16 and the 18-in. caps was filled with acidproof concrete, while the 6-in. cap was welded snugly all around the rim.

Subsequent inspection of the target indicated that spreading of the catalyst had been accomplished with the result that erosion of the grid had been arrested. Erosion of caps was noted, but replacement of any of the three or all of them is a simple and inexpensive operation during a turnaround, and a longer effective service life for the grid has been made possible.

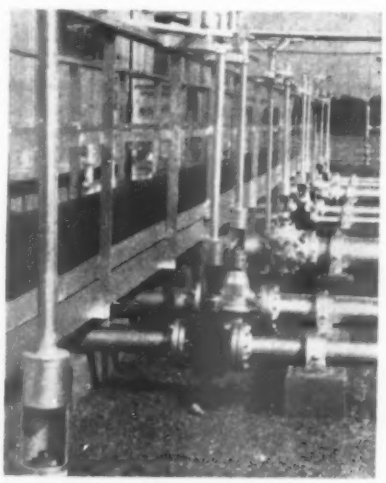


REACTOR RISER TARGET which reduces erosion of grid due to impact of catalyst.



Protecting Instrument Tubing

EXPANDED-STEEL coverings are here being employed to protect instrument tubing. Photo was taken at East Vealmoor, Tex., plant of Reet Fields Gasoline Corp.



Valve-Stem Extension

HERE is a slotted valve-stem extension for tapered plug valves which makes it possible to adjust the nut when it is desired to make the seat tighter without having to remove the extension. Installation at Bowie Gasoline plant at Bowie, Tex.

Sizing Tank-Farm and Delivery Lines—Errata

IN the article "How to Size Tank-Farm and Delivery Lines at Products Pipe-Line and Marine Terminals" by Edwin A. Birge, The Oil and Gas Journal, September 21, 1953, page 178, the term

$$\sqrt[0.54]{\frac{Q}{C}}$$

was erroneously printed as $(Q/C)^{0.54}$.

The article therefore appeared with errors specifically as follows:

On page 179, Eq. (1), at the bottom of the middle column, is given correctly. However, in the right-hand column of page 179 the term

$$P = S\,(162.04/D^{2.63})^{0.54}$$

should be

$$P = S\sqrt[0.54]{\frac{162.04}{D^{2.63}}} \times \sqrt[0.54]{\frac{Q}{C}}$$

The sentence "For any given size of pipe and specific gravity of product the term $S(162.04/D^{2.63})^{0.54}$ becomes a constant."

This should read, "For any given size of pipe and specific gravity of product the term

$$S\sqrt[0.54]{\frac{162.04}{D^{2.63}}}$$

becomes a constant."

The term for Eq. (2):

$$P = K\,(Q/C)^{0.54}$$

should be

$$P = K\sqrt[0.54]{\frac{Q}{C}}$$

The statement "Chart 2 is a conversion chart to reduce the ratio Q/C to $(Q/C)^{0.54}$." (7th and 8th lines from bottom of right-hand column of page 179.)

This should read, "Chart 2 is a conversion chart to reduce the ratio Q/C to $\sqrt[0.54]{\frac{Q}{C}}$."

On page 180, left-hand column, the term $P = K_{10''}\,(3000/140)^{0.54}$ (5th line from top).

Should read

$$P = K_{10''}\sqrt[0.54]{\frac{3000}{140}}$$

Immediately below that the sentence, "The ratio 3000/140 = 21.4, and from Chart 2, $(21.4)^{0.54} = 290$."

Should read

The ratio 3000/140 = 21.4, and, from Chart 2,

$$\sqrt[0.54]{21.4} = 290."$$

The term $P = K\,(Q/C)^{0.54}$ (3rd line from bottom)

should read

$$P = K\sqrt[0.54]{\frac{Q}{C}}$$

Also on page 180, the caption under Chart 2 should read:

"This chart makes it easy to obtain the value

$$\sqrt[0.54]{\frac{Q}{C}}."$$

The caption under Chart 4 should read:

"Obtaining values of $\sqrt[0.54]{\frac{C}{Q}}$."

On page 283, at top of page, left-hand column, the term $EP_1 = L_1K_1(Q/C)^{0.54}$ should read

$$EP_1 = L_1K_1\sqrt[0.54]{\frac{Q}{C}}$$

The term $EP_2 = L_2K_2(Q/C)^{0.54}$ should read

$$EP_2 = L_2K_2\sqrt[0.54]{\frac{Q}{C}}$$

The term

$$EP_1 + EP_2 = EP = L_1K_1\,(Q/C)^{0.54} + L_2K_2\,(Q/C)^{0.54}$$

should read

$$EP_1 + EP_2 = EP = L_1K_1\sqrt[0.54]{\frac{Q}{C}} + L_2K_2\sqrt[0.54]{\frac{Q}{C}}$$

Equation (3) is given correctly.

At top of page 283, in right-hand column, the expression for Eq. (4),

$$K_1 = (C/Q)^{0.54} \times EP/L_1 - L_2K_2/L_1$$

should read

$$K_1 = \sqrt[0.54]{\frac{C}{Q}} \times \frac{EP}{L_1} - \frac{L_2K_2}{L_1}$$

Below the middle of the page, running across both columns, "The term within brackets:

$$[1{,}000/(10 \times 0.12 + 15 \times 0.3655)]^{149.7},"$$

should read

"The term within the brackets:

$$\left[\frac{1000}{10 \times 0.12 + 15 \times 0.3655}\right] = 149.7,"$$

On page 284, under the bold-face word "Solution": "Equation 4 becomes:

$$(140/5{,}000)^{0.54} \times 32.4/0.46 - \frac{0.08 \times 0.3655}{0.46}."$$

should read

"Equation 4 becomes:

$$\sqrt[0.54]{\frac{140}{5{,}000}} \times \frac{32.4}{0.46} - \frac{0.08 \times 0.3655}{0.46}$$

Below that, the sentence, "From Chart 4: $(0.028)^{0.54} = 0.0013$"

should read

From Chart 4:

$$\sqrt[0.54]{0.028} = 0.0013$$

On page 286, about the middle of the page, the expression "Equation 4 becomes

$$K_1 = (125/10{,}000)^{0.54} \times 0.73/0.83 \times 52.7/0.46 - \frac{0.08 \times 0.029}{0.46},"$$

should read

Equation 4 becomes:

$$K_1 = \sqrt[0.54]{\frac{125}{10{,}000}} \times \frac{0.73}{0.83} \times \frac{527}{0.46} - \frac{0.08 \times 0.029}{0.46}$$

Below that the expression, "From Chart 4, $(0.0125)^{0.54} = 0.0003$"

should read.

From Chart 4,

$$\sqrt[0.54]{0.0125} = 0.0003$$

Wire-Mesh Symposium

(Continued from page 87)

baffle trays are located 15, 18, and 20 ft. from bottom, respectively. Because of the severe corrosive conditions, the entire tower has been given a stainless steel lining.

Tower products . . . Under normal operating conditions, tower yields consist of 60 per cent bottoms, 10 per cent sidedraw, and 30 per cent overhead through the two 30-in. vacuum lines. The bottoms average about 7.5° gravity and have a viscosity of 500 to 1,000 seconds at 210° F. (Saybolt Furol). The sidedraw stream, which is used as a flux oil in the T.C.C. charge, averages about 19° gravity and 31 seconds viscosity. Overhead gas oil runs about 22° gravity.

A portion of the sidedraw stream is used to control tower operations. Likewise a fixed amount of the top product is used to reflux the bubble tray for the purpose of producing a cleaner stream.

Installation of Blanket

The mesh blanket was installed about 2 ft. below the sidedraw accumulating channel. The 4-in.-thick, Type 304 stainless-steel knitted blanket was installed in sections, precut to fit the tower's 17-ft. 8-in. inside diameter. At the same time the Type 410 stainless-steel bubble tray, equipped with Type 304 caps, was placed in the top of the tower.

Original installation . . . To hold the blanket an angle-iron support ring was tack welded to the tower wall. A lightweight spider then was fabricated to rest on the support ring. This in turn was used to support the sectional grid to which the blanket was tied. Stainless steel was used for this grid, as were all other parts of the support. It consisted of ⅛ by 1-in. strap, placed on edge at about a 5-in. spacing and tied together with ¼-in. stainless-steel weld rods.

When the first blanket was installed in December 1951, only this bottom grid was used. The metal and ash content in the tower products promptly recorded a substantial decline as shown in Table 5. This desirable condition was maintained until early March 1952, when fragments of wire mesh began causing trouble in the vacuum-tower bottom pumps. Analysis of the top and sidedraw streams showed that

HENRY H. PARIS DISTRIBUTOR Inc.
Manufacturer's Agent - Oil Well and Refinery Supplies
P. O. BOX 932 1125 ROTHWELL ST.
HOUSTON, TEXAS

Agent and Distributor for the following Nationally Known Manufacturers:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Pumping Units, Jacks & Surface Equipment.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

LOS ANGELES BOILER WORKS
Los Angeles, California
Welding Caps—Dished & Flanged Heads.

MILLS IRON WORKS, INC.
Los Angeles, California
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

MUD PRODUCTS, INC.
Tulsa, Oklahoma
Mud-"O"-Ring Butterfly Valves.

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC Valves, Bronze, Iron, Cast and Forged Steel for all purposes.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

STEEL FORGINGS, Inc.
Shreveport, La.
Weld Saddles.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

while the former was unaffected there were high quantities of vanadium and nickel in the sidedraw stream.

Later installation . . . Inspection of the tower revealed the mist eliminator had partially torn away from the grating in an upward direction. About 60 per cent of the blanket area had folded toward the outside edges, leaving a hole in the center. Because of its over-all poor condition the blanket was removed and a Type 316 stainless steel installed in its place.

To prevent this one from being torn away from its supports, a second grid was installed on top of the blanket. It was bolted to the bottom grid, using spacers to prevent the blanket from becoming compressed.

Improvement . . . Inspection of the streams in March 1952 showed their ash and metal content to be approximately 10 per cent of the amounts before use of mist eliminators was adopted. No further mechanical difficulties have been encountered and the metal content of the top and sidedraw stream has remained at this low level, as shown in Table 5.

When the tower was shut down last December, after the second blanket had been installed for about 9 months, its over-all condition was found to be in good shape but several small burnouts had occurred near the center. These were patched, using pieces cut from spare sections, and the tower returned to operation. Only washing done was that to remove vapors from the tower prior to inspection.

Major Companies Examine Oil Prospects

(Continued from page 91)

the Persian Gulf, through southern Turkey, and sweeps southward to Israel and Egypt.

The orogenic zone in which the oil fields of southeastern Turkey are situated lies south of the zone of thrusting of Taurus and Anti-Taurus and north of the foreland. Compression is characteristic of the more recent structures though the vertical movements in the basement rocks seem to have brought about block folding in a few structures such as Kentalan. The role of the Alpine orogeny, however, must be considered as the dominant factor in the structural sculpturing of the land in Turkey and her southeastern neighbors.

Oil Development

The question of economic oil accumulation in the petroliferous basin of southeastern Turkey is principally one of adequate cover. Where this

cover is satisfactory oil is present but where induration or faulting, or both, are appreciable, drilling has recorded shows of more or less desiccated oil only. In southeastern Turkey no well has been drilled so far which has shown no oil or gas indication. It was not until 1940, however, that oil in near-commercial quantities was encountered; and it was not until 1948, when 9 Raman was acidized, that Raman could be classified as an oil field.

It was 3 years after the completion of Raman 9 that Garzan, with two producers, gave Turkey its second oil field.

At present there are 12 producing wells at Raman and 3 at Garzan with an average production of 350 bbl. per day of 20° and 26°-gravity oil, respectively. All the wells are pumpers. Some wells on special tests have been pumped up to 1,000 bbl. per day without losing their fluid level. The cumulative production from these fields, to the end of June 1953, has been 615,000 bbl., half of which has been run into the pilot distillation plant at Batman and the other half has been used in the locomotives running between Diyarbakir and Kurtalan.

Upon the discovery of oil at Raman in 1940 a small refining unit was improvised at Maymune near 1 Raman. With the completion of 9 Raman in 1948 a distillation plant capable of handling 350 bbl. of crude per day was constructed at the Batman station on Diyarbakir-Kurtalan line.

Refinery plans . . . Early in 1951 it was decided to build a modern refinery at Batman to answer the demand for petroleum products in 19 districts in eastern and southeastern Turkey. The original plan which was for a 3,000-bbl. per day distillation unit was changed to 5,000-bbl. per day thermal cracking plant and, finally, to 6,250-bbl. per day catalytic cracking installation. The contract for building the refinery in its latest form was given to Ralph M. Parsons Co. late in December 1952 and the contract signed early in January of this year. This modern refinery is expected to be complete and ready for its initial tests before 1955.

Foreigners to participate . . . The closing weeks of 1952 are memorable for a still more important step taken by the Government of Turkey. The decree by the Council of Ministers published on November 22, 1952, announced the Government's decision to take the necessary legal steps to permit the participation of foreign capital in the exploration and exploitation of the oil resources of the country.

The liberal step taken in Turkey at a time when the tempestuous uproar for nationalization in other Near East lands was the order of the day attracted world-wide interest to Turkish oil prospects. The engagement of a prominent oil consultant who had just finished a similar work in Israel to help draft a petroleum law that was fair to both Turkey and foreign capital has indicated the seriousness and sincerity of the Government. The principal representatives of foreign capital have not been laggard in their reception of the news. To date four major companies have their geologists in the fields examining the prospect to be ready to act when the draft law becomes a law in the Turkish parliament. This is expected to take place before the close of 1953.

Reference

1. Cevat E. Tasman, Stratigraphic Distribution of Evidences of Bituminous Substances in Turkey, Bull. A.A.P.G., Vol. 34, No. 8, pp. 1718-28.

2. Cevat E. Tasman, Stratigraphy of Southeastern Turkey, Bull. A.A.P.G., Vol. 33, No. 1, pp. 22-31.

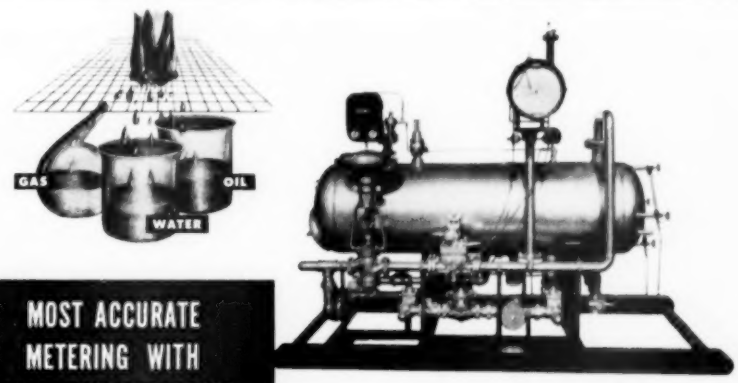
3. N. Tolun and Z. Ternek, Notes géologiques sur la region de Mardin, Bull. Geol. Soc. of Turkey, Vol. 3, No. 2.

Catalytic Cracking

(Continued from page 102)

the catalyst is stripped of entrained vapors by means of steam. The stripped catalyst enters a standpipe and is then injected into the regenerator inlet line, at which point it is picked up by the combustion air and carried into the regenerator.

The combustion of the carbon takes place in a fluid bed which is supported by the air required for combustion. The flue gases leave the fluid bed and enter a disengaging zone, where most of the entrained powder is settled out, and then enter a single stage of cyclone separators that remove approximately 90 per cent of the entrained catalyst. The hot flue gases and a small quantity of powder leave the regenerator proper and flow to the flue gas cooler and thence to the Cottrell precipitator. In the flue-gas cooler the gas and entrained powder are cooled by steam generation. Practically all of the remaining catalyst is recovered from the flue gas in the single stage Cottrell precipitator from which the flue gas is vented through a pressure control valve to the atmosphere. Catalyst recovered by the Cottrell is collected in the hopper beneath the precipitator from which it flows into a standpipe which builds up sufficient pressure that it can be blown back to the regenerator bed just above the grid.



MOST ACCURATE METERING WITH EXCLUSIVE DEGASSING ELEMENT

TEST SEPARATORS

Well fluid is separated into the three phases of oil, gas, and water. Any one or all three of these phases may be metered. The degassing and defoaming element assures maximum oil metering accuracy by completely separating oil and gas and by breaking up foam. *Oil Metering* Test Separators are available in any size and working pressure required. Write for bulletin WT-952.

The Industry's Standard for Field Metering and Processing Equipment

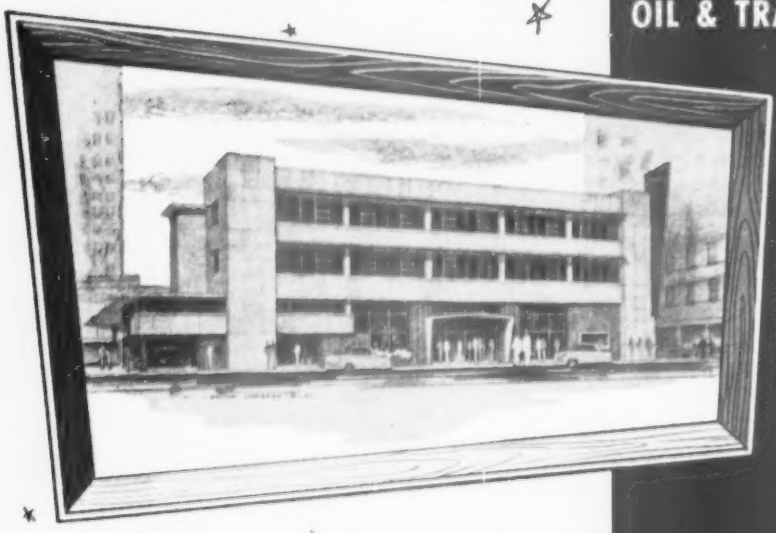
OIL METERING and Processing EQUIPMENT CORP.

OIL METERING AND PROCESSING EQUIPMENT CORPORATION

4843 YALE STREET • HOUSTON 18, TEXAS • MElrose 1226

Export Office: Val R. Wittich, 30 Rockefeller Plaza, New York 20, N. Y.

SPACE AVAILABLE IN DENVER'S OIL & TRANSPORTATION CENTER



10,000 square feet available March 15, 1954, to one tenant for modern offices in the new

CONTINENTAL TRAILWAYS BUS CENTER

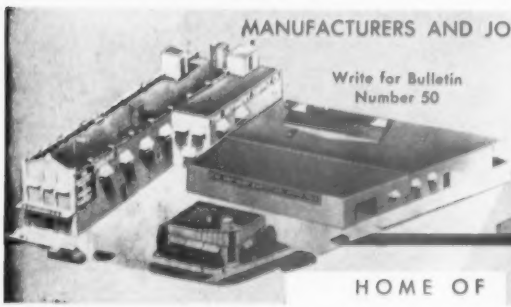
Entire second and third floors of this beautiful new building in downtown Denver will provide outstanding facilities for your business. Investigate today.

FOR DETAILS WRITE OR CALL . . .

McINTOSH-BARTON & CO.

1658 BROADWAY • DENVER, COLO. • TAbor 6235

MANUFACTURERS AND JOBBERS OF **SCIENTIFIC INSTRUMENTS**



Write for Bulletin Number 50

HOME OF **Ac-Me & R. S. SPECIALTIES**

Ac-Me RECORDING GRAVITOMETER
Ac-Me SPECIFIC GRAVITY GAS BALANCE
Ac-Me PRESSURE VACUUM PUMP
R. S. MERCURY CLEANER
R. S. MANOMETER
R. S. DEAD WEIGHT GAUGE
R. S. DEAD WEIGHT TESTER
R. S. ORIFICE WELL TESTER
R. S. MOISTURE TESTER
R. S. FLAT BORE YEL-O-BAK THERMOMETERS
R. S. STREAMLINED HYDROMETERS
R. S. PULSAMETER
R. S. PRESSURE HYDROMETER JARS
R. S. VAPOR PRESSURE BOMB
R. S. DIAMOND CORE DRILL
R. S. THERMO PLUMB BOB THERMOMETERS
R. S. SUPER PRESSURE CONSISTOMETER
R. S. SMOKE METERS

COMPLETE LINE OF SCIENTIFIC LABORATORY EQUIPMENT INCLUDING CENTRAL SCIENTIFIC SPECIALTIES

cenco

Cenco . . . one dependable source of supply for everything you need in scientific instruments and laboratory supplies. Over 15,000 items . . . 14 branch offices and warehouses.

R.S.G. TULSA

REFINERY SUPPLY COMPANY
621 EAST FOURTH STREET • TULSA 3, OKLAHOMA
2215 McKINNEY AVENUE • HOUSTON 3, TEXAS

CENTRAL SCIENTIFIC COMPANY
1700 IRVING PARK ROAD • CHICAGO 13, ILLINOIS
CHICAGO NEWARK BOSTON WASHINGTON DETROIT SAN FRANCISCO
SANTA CLARA LOS ANGELES TORONTO MONTREAL VANCOUVER OTTAWA

Refinery Centrifugal Compressor Performance—1

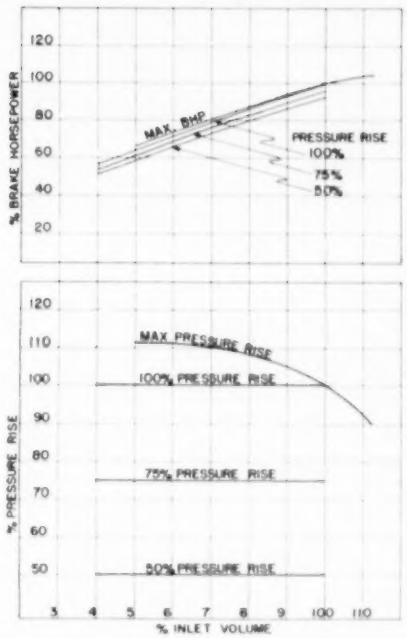
by H. C. Mayo

A RELIABLE air supply is essential for operation of catalytic cracking units. Attention has therefore been directed to the performance of centrifugal compressors employed for such service in the refinery. In this and the following installment typical characteristic curves will be presented for variable and fixed-speed centrifugal compressors with various methods of capacity and discharge pressure control.

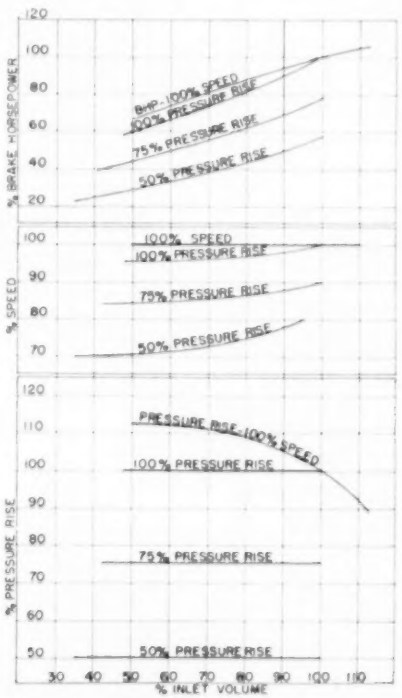
Examination of the three charts on this page and the two to follow show that the operating range of commercially available constant-speed centrifugal compressor is adequate for any application in a fluid catalytic cracking unit. However, the power input at reduced capacity and rated discharge pressure is slightly greater on constant-speed centrifugal compressors than on variable-speed compressors operating at reduced speed, and is substantially higher on fixed-speed compressors operating with rated inlet conditions and reduced discharge pressure, or rated discharge pressure with higher than rated inlet density.

The high permissible operating speed and variable-speed operation make the steam turbine an ideal driver for a centrifugal compressor. Capacity and discharge pressure are easily and economically controlled by speed variation. Motor top speeds on 60-cycle systems are limited to 3,600 r.p.m. In most cases motor-driven centrifugal compressors use geared slow-speed motors. Speed control is possible but expensive.

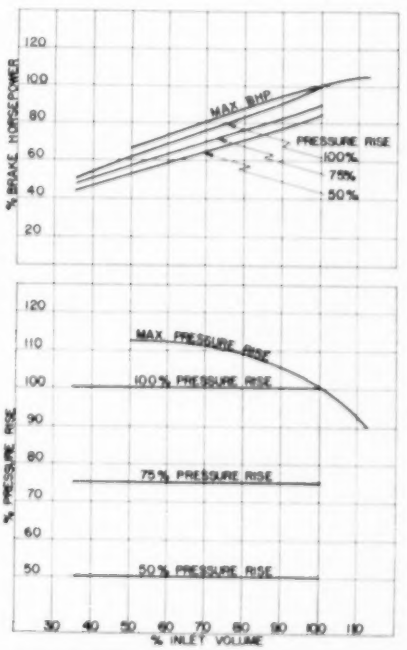
Author is equipment engineer, M. W. Kellogg Co. See article "Driving the Cat Cracker Blower . . ." by H. C. Mayo, The Oil and Gas Journal, September 7, 1953, p. 86.



Estimated performance curves for multistage, constant-speed centrifugal compressors with inlet guide vanes (motor drive).



Estimated performance curves for multistage, variable-speed centrifugal compressors (turbine drives).



Estimated performance curves for multistage, constant-speed centrifugal compressors with suction throttling (motor drive).

CORROSION which protects rather than destroys

THE RUST-PROOFING of iron and steel products is a "sacrificial" function of metallic zinc which for many years has accounted for the metal's largest single use. Nearly 50% of all the zinc consumed in the United States is used for galvanizing. This "sacrificial" characteristic of zinc in providing iron and steel with low-cost protection against rust is also responsible for the increasing use of the metal in the form of anodes for the cathodic protection of pipe lines and other underground iron and steel structures. The property of zinc which makes this possible is due to the metal's advantageous position in the electromotive series. As indicated by the listing on the right, zinc – of the commonly available metals – stands far enough below iron so that its electronegative potential provides effective and economical cathodic protection, but not so far as to sacrifice itself needlessly in doing its job.

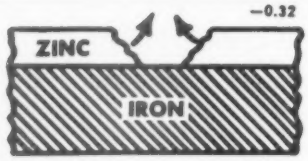
ELECTROMOTIVE SERIES of the COMMON METALS*

Vs. H_2		Vs. Iron
+1.36	Gold	+1.80
+0.86	Platinum	+1.30
+0.798	Silver	+1.23
+0.344	Copper	+0.78
0.000	HYDROGEN	+0.44
−0.12	Lead	+0.32
−0.14	Tin	+0.30
−0.23	Nickel	+0.21
−0.40	Cadmium	+0.04
−0.44	IRON	0.000
−0.56	Chromium	−0.12
−0.762	Zinc	−0.32
−1.33	Aluminum	−0.89
−1.55	Magnesium	−1.11

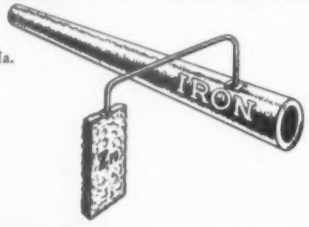
**U. R. Evans, "Metallic Corrosion, Passivity & Protection"*

Rusting is an electrochemical action in which iron replaces hydrogen, or a metal, in an electrolyte. Each metal has its own definite activity in this respect, which is termed its electro-potential. A list of the metals arranged in increasing order of activity, with their electro-potential expressed in volts is called the Electromotive Series. For convenience – at the right hand side of the above table – the zero point has been placed at iron and the figures, since they are relative only, have been transposed to show the metals' activity relative to iron.

I. Tin, electro-positive to iron, has no protective action.



II & IIa. Zinc, electro-negative to iron, with a driving voltage of 0.5 volt more than iron in soil or water, provides efficient protective action through sacrificial corrosion.



52 PAGES OF NEW DATA

For complete details on this application of zinc, write for free booklet, CATHODIC PROTECTION WITH ZINC ANODES.

BUNKER HILL 99.99+% ZINC · ST. JOE High Grade ZINC

ST. JOSEPH LEAD COMPANY
250 PARK AVENUE, NEW YORK CITY 17

for Galvanic & Cathodic Protection Zinc is Standard

Drill-Stem Tests—1

ONE of the most dangerous phases of oil-well drilling is still in the taking of drill-stem tests.

In no way do the recommendations listed below cover all of the "must" items to be considered in conducting drill-stem tests, but should serve to inspire individuals to propose their own suggestions for eliminating the hazards now existing in taking tests.

The following safe practices are recommended:

1. An informal meeting will be held, prior to going in the hole. In order that everyone will know how the job is to be done, all persons participating in the taking of a drill-stem test, such as contractor, operator and employes, should be present. Such items as safety factors, exits and wind direction, etc., should be discussed.

2. One person only should act as supervisor in giving orders and it should be understood by everyone concerned.

3. It should be made mandatory that every man working on the job wear safety hats and safety shoes.

4. Mud will be conditioned to resist any possible blowout that may be encountered.

5. Fillup lines will be installed on the drilling nipple above the blowout preventer to keep the casing full of mud, and should be used only for this purpose. Provisions for kill line should be made separate.

6. Blowout preventer is to be checked before going in the hole, also before coming out.

7. The cellar is to be jetted, providing no drain is available.

8. All heating stoves and open fires are to be extinguished as a precautionary measure to prevent a fire hazard.

9. Be sure all ignition wiring is properly insulated on motor rigs.

10. On electric rigs, be sure the blowers are operating properly.

11. All generators should be disconnected or shut down.

12. All steam rigs should have a steam line connected to the boiler firebox to snuff out the fire in case the well blows out.

Courtesy of A.A.O.D.C.

13. All exhausts on motor rigs should be wrapped in asbestos to prevent a fire hazard.

14. Water connections to manifold are to be checked for proper spray.

15. Be sure all high pressure swings are snubbed or anchored down.

16. Mud guns should be installed in such a place that in case of fire they can be used on or under the floor.

17. All fire fighting equipment is to be inspected before starting the test to be sure they are full and in workable condition.

18. All persons, either workmen or visitors, are to leave all smoking tobacco, such as cigarettes, cigars, pipes, etc., and all matches and lighters in their car or doghouse, so as to prevent anyone from unconsciously using smoking tobacco.

19. Warning signs should be installed to warn visitors and drivers of vehicles to be cautious when entering the lease.

20. The driller is to designate the responsibility to one of his crew members to see that the casing is kept full of mud at all times while going in or coming out of the hole.

21. Never take the hose off to let the well flow through the kelly and out of the goose neck, especially on a portable derrick.

22. Pipe size and condition will be analyzed before considering a deep hole test, to prevent drill pipe from collapsing provided it is not to be filled with water.

23. One experienced cathead man, usually motorman or fireman, will operate the cathead at all times.

24. No drill-stem test will be conducted at night, but will be so arranged to finish before dark.

25. No test should be conducted during electrical storms or rain storms due to static electricity.

26. In turning drill pipe with tongs or wrenches to open the tool, under no circumstances should more than one tong or wrench be used. If more power is needed, use a longer handled wrench. Cheaters and spinning lines are prohibited.

27. An opening should be made available in the windbreaker so the derrick man will have immediate access to his safety slide.

28. Derrick man should check his safety slide and line to be sure it is workable. Be sure the line is not coated with ice.

29. Due to so many different types of tool joints, every rig should be equipped with a safety tool plug for each string of pipe.

30. Mud box to be rigged up with a flexible line extending from flow line to the floor with a quick union.

The A.A.O.D.C. agreed on the above stated 30 safe practices, but feels these are not yet adequate.

Drilling Safety

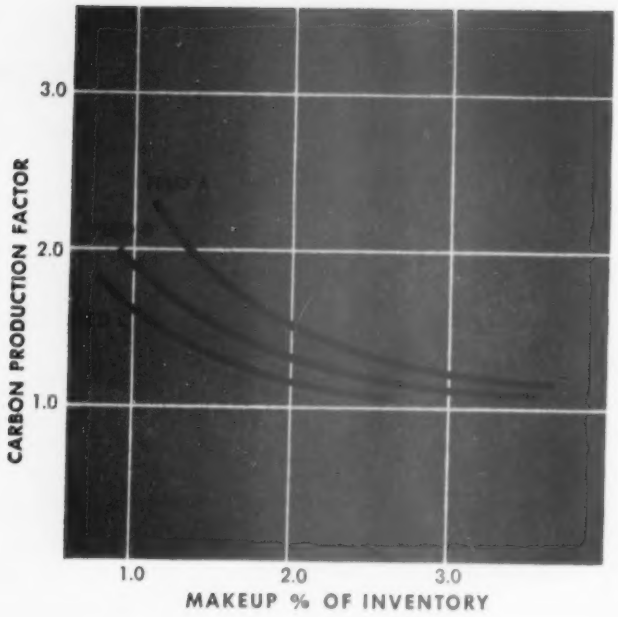
Rig wiring system . . . Rig wiring and lighting system is an integral part of a drilling rig and should be maintained in a safe manner. When working on light wires, have someone near to turn electricity on and off as required. The wiring system should be maintained as much as possible during daylight hours. All naked wires should be wrapped immediately with electrical tape.

Wires should be kept away from vibrating surfaces so the insulation will not wear off. Proper size fuses should be used and installed with a fuse puller. When in doubt as to where something is electrically charged, jump off of it instead of stepping off.

It isn't a good policy to send one man away from the rig to work on machinery or to do any job alone. He has no way of letting you know if he gets caught in something or if he is hurt, sick, or needs anyone to help him. Even if two men are sent to do a job, it is a good idea to check on them at intervals. A person working on any machine alone and even a short distance away is subject to getting hurt.

A driller should know at all times where each of his crew is and what he is doing.

Suggestions and recommendations: Driller should keep a good check on his men. Each crew member should know what others are doing and danger of getting hurt involved. Do not send one man to do a job.



Optimum Catalyst Selectivity For Your $$

OTHER
REASONS FOR USING
FILTROL CATALYSTS

1. Higher Octane Barrels
2. High Butylene Yields
3. Sulphur Resistant Catalysts
4. Faster Regeneration Rate
5. Low Attrition Rate
6. Technical Service
7. Uniformity
8. Lowered Excess Butane
9. Varied Plant Facilities

MANY TYPES OF FEED STOCKS CONTROL CRACKING CATALYST SELECTIVITY, PARTICULARLY WHEN OBTAINED BY CUTTING DEEPER INTO CRUDES.

THE LOW COST FILTROL CATALYSTS GIVE BETTER SELECTIVITY PER DOLLAR EXPENDED. FOR EXAMPLE, WITH A CONTAMINATING FEED STOCK, CARBON PRODUCING FACTORS (CPF) FOR VARIOUS CATALYSTS PER $1000 PER DAY CATALYST EXPENSE ARE AS FOLLOWS:

UNIT CATALYST COST	TONS/$1000	CPF
$350/TON	2.86	2.0
$155/TON	6.35	1.4
$100/TON	10.0	1.2

AT CARBON BURNING LIMITATION EXTRA CAT CRACKER THROUGHPUT AVAILABLE BY REDUCING CPF IS:

CPF	**PERCENT INCREASE IN THROUGHPUT	APPROXIMATE EXTRA INCOME
2.0		
1.4	23.5	$ 9,000
1.2	36.5	$14,500

**Basis catalytic cracking operation at 30,000 B/D throughput.

Filtrol*

FILTROL CORPORATION

OFFICES: 727 WEST SEVENTH STREET, LOS ANGELES 17, CALIFORNIA
PLANTS: VERNON, CALIF.; SALT LAKE CITY, UTAH; JACKSON, MISS.

CATALYSTS AND ADSORBENTS

*T. M. REG. U. S. PAT. OFF.

ELECTRIC LOGGING—12

Formation of the Mud Filtrate

by R. I. Martin

A CONDITION mentioned but not studied yet is that of invasion of the mud filtrate. One of the requirements of the drilling mud used is that it prevent fluids from entering the well. In order to be sure that it does so, it is customary to control the weight so that an excess differential pressure of from 200 to 400 psi. above that of the highest pressure sands will be exerted. As a result of this differential pressure, the mud tends to escape into permeable formations. It is usually prevented from doing so because the solids are large enough to bridge the pore openings. In this way a mud cake is built up from the solids, while the liquid associated with these solids escapes into the permeable formation. The buildup is rapid at first but then decreases exponentially, because the permeability of the mud cake is very low, and decreases rapidly as the thickness increases.

During drilling, this cake may be partly removed by the whipping and dragging of the drill pipe and tool joints. When this happens the mud cake rebuilds with an accompanying loss of filtrate. Although the mud cake has a low permeability it is doubtful that it ever becomes low enough to prevent any loss of fluid. With a good mud, however, the rate of loss under steady state conditions is extremely low, although there must be some loss while the cake is being formed.

Because the permeability of the mud cake is so much less than that of most reservoir rocks, the fluid loss is controlled by the mud cake. If the formation has a low porosity this escaping fluid will have to occupy a greater volume of rock than if the formation has a high porosity. For this reason the depth of invasion is greater in rocks of low porosity because their storage capacity is smaller.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

Another important variable is the differential pressure. The mud weight necessary is established by the pressure in the highest pressure sands, and the differential pressure is therefore greater opposite sands which have a lower pressure than these. This lower pressure may be due to partial depletion, or to an original variation in formation pressure. A greater differential pressure will cause a greater fluid loss.

For several years it was assumed that the resistivity of this mud filtrate was identical with the resistivity of the mud. Work done by Patnode[1] which was published in 1949 shows that the ratio of the resistivity of the filtrate to the resistivity of the mud varies from 0.66 to 1.50. Because of this possible variation of 50 per cent it should become the practice to measure both mud resistivity and mud filtrate resistivity when detailed investigations are to be made.

Another factor to be considered is the distribution of this filtrate in the reservoir rock. In a salt-water sand several pore volumes of fluid have to be passed in order to displace all the connate water. The amount necessary to do this will increase as the permeability decreases. In the case of an oil sand the nonwetting phase can never be displaced completely so that there will always be a residual oil saturation, even where the connate water has been displaced completely. This residual oil saturation is higher in sands of low permeability than it is in sands of high permeability.

Fig. 1 represents a possible distribution of fluids when invasion is considered. The upper part shows a cross-section through the bore hole. The invaded zone is shown as a cylinder of a certain radius, coaxial with the bore hole. This is an approximation, which has to be used in practice, but the results obtained are usually satisfactory. (The lower part of Fig. 1 will be explained in Installment 13.)

Reference

1. Patnode, W. H., "Relationship of Drilling Mud Resistivity to Mud Filtrate Resistivity," Trans. A.I.M.E., 186, pp. 14-16.

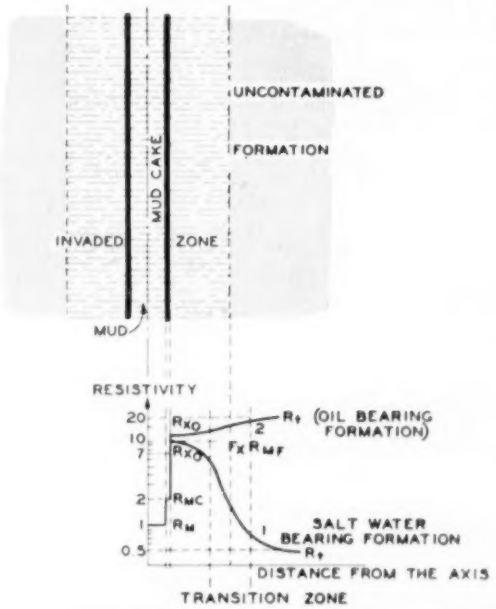


Fig. 1—Effects of the invasion of the mud filtrate. (Schlumberger Well Surveying Corp., Document No. 4, page 60.)

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

How Painting Affects Storage-Tank Losses

"How much more does the loss increase, or the temperature rise, when using light - cream - colored paint as compared with white or aluminum paint?" J.B.

No specific answer can be given to this question unless the conditions are carefully limited and even with such information, a precise answer is usually not possible. However, under most conditions, more heat would be reflected or lost from light-cream-colored paint than from aluminum paint but less than from a white-painted surface.

Confusion arises not only because experimental data are incomplete, but also because the behavior of tanks, steam heaters (radiators), transformers, etc., are not always comparable. Because of the lack of comparable information, it was felt than an average representation of all available data was more useful than any single set of experimental data.

Accordingly Table 1 lists experimental data in terms of white paint as 90 per cent effective in reflecting radiation and black paint as zero per cent effective. Glossiness in the surface of paint or polish on the surface of a metal has a very large effect and this effect could not be properly accounted for.

Weathering also decreases the effectiveness of paint. Examination of Table 1 also indicates that no opportunity to check one authority against another was possible except in the case of aluminum paints. The range of data on aluminum relative to white paint is reasonably good (42.7-69.8) except for the data of one authority[6] which indicate a reflective value of 93 relative to white paint.

In order to apply the data of Table 1 to a specific case, it is necessary to know something of the specific conditions. Accordingly, Reference 1 shows that the daily variation in the vapor-space temperature of a tank can be estimated by multiplying the daily variation in atmospheric temperature by the following factors:

Atmospheric variation, °F.	Unpainted or black (about 10 on Table 1)		White or aluminum (about 75 on Table 1)	
	Nearly full	¾ full or less	Nearly full	¾ full or less
40	1.6	1.3	1.25	0.9
25	2.1	1.6	1.5	1.0
15	2.9	2.2	1.8	1.2
10	3.6	2.7	2.1	1.3

Cream-colored paint with a factor of 72.8 on Table 1 would behave a little less effectively than the white or aluminum paint of tabulation.

Reference 8 indicates for large tanks that about 0.34 per cent of gasoline is lost per month from white tanks whereas about 0.46 per cent is lost from new aluminum painted tanks.

When the average atmospheric temperature is about 85°F., Reference 4 shows that the vapor-space temperature is about 21°F. above the atmospheric temperature for white tanks but 81° F. higher for unpainted tanks. Likewise, the liquid temperature was 6° F. lower than atmospheric temperature for white tanks and 3° F. higher for unpainted tanks.

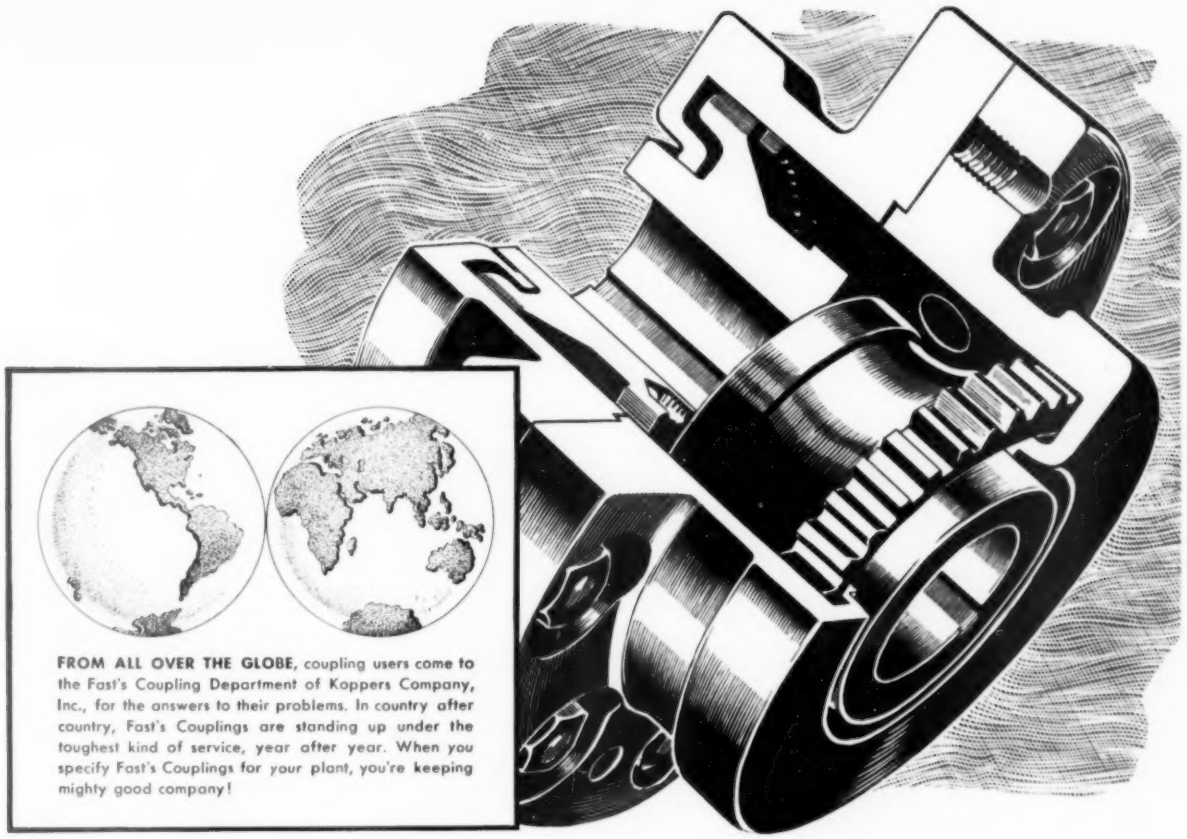
Exposure of half-full tanks[6] to the sun for 2 hours cause a vapor-space temperature of 111° F. in a black-painted tank but only 100° F. in a white tank. The percentage of gasoline loss was 9 per cent from the black tank but only 4 per cent from the white tank.

TABLE 1—RELATIVE EFFECTIVENESS OF PAINTS IN KEEPING TANKS FROM WARMING IN THE SUN (White is 90 and Black is Zero).

	Relative effectiveness as reflector or rejector of heat		
	Average	Range	Reference
Soot	—7.5		3
Black	0		2, 8
Red (bright)	17.2	16.4-18.0	6
No paint	10.0	0-20	4, 7, 11
Red (dark)	21.3	18.0-24.6	6
Green (dark)	21.3	18.0-24.6	6
Red	27.6		3
Aluminum (weathered)	35.5	26.4-41.5	8
Green (dark chrome)	40.4		6
Green	40.8		3
Blue	45.5		3
Gray	47	41.0-54.0	6
Blue (dark Prussian)	49.5		6
Yellow	56.5		3
Gray (light)	57.0	35.0-79.0	5, 9, 11
Aluminum	59.2	42.7-93.0	1, 6, 7, 9, 11
Tan	64.5	57.0-72.0	6
Aluminum (new)	67.0	62.3-72.0	8, 9
Red iron oxide	69.5		6
Cream or pale blue	72.8	72.0-73.2	6
Green (light)	78.5		6
Gray (glossy)	81.0		3
Blue (light)	85		6
Pink (light)	86.5		6
Cream (light)	88.5		6
White	90		1, 11
Tin plate	97.5		6
Mirror or sun shaded	100		3, 7

References

1. Nelson, W. L., Computation of Evaporation Losses, The Oil and Gas Journal, June 23, 1953, p. 111.
2. O'Brien, H. L., (Graver Tank & Manufacturing Co.) Petroleum Tankage and Transmission, 1951, pp. 27 and 28.
3. Jones, L. G., How Does Your Power Plant Absorb Heat? Power Engineering, Feb. 1953, p. 64.
4. McCullough, et al., Reducing Losses of Volatile Liquids in Atmospheric Pressure Storage, Nat. Pet. News, Feb. 6, 1946.
5. Lotz, P. L., Paint Programs to Prevent Corrosion and Evaporation Losses, Ref. Nat. Gaso. Mfr., March 1942, p. 90.
6. Cross, Roy, Losses in the Storage of Crude, Oil Gas News, (1923?) p. 16.
7. Anon, Savings From Painting of Gasoline-Storage Tanks, The Oil and Gas Journal, April 16, 1942, p. 51.
8. Smith and Harden, Conservation of Products in Storage, The Oil and Gas Journal, July 14, 1952, p. 125.
9. Company A—Evaporation Loss of Petroleum . . ., A.P.I. meeting, Nov. 10, 1952.
10. Company C—Evaporation Loss of Petroleum . . ., A.P.I. meeting, Nov. 10, 1952.
11. Company D—Evaporation Loss of Petroleum . . ., A.P.I. meeting, Nov. 10, 1952.



FROM ALL OVER THE GLOBE, coupling users come to the Fast's Coupling Department of Koppers Company, Inc., for the answers to their problems. In country after country, Fast's Couplings are standing up under the toughest kind of service, year after year. When you specify Fast's Couplings for your plant, you're keeping mighty good company!

In world-wide reputation for rugged dependability . . .

FAST'S Couplings are FIRST!

Fast's Couplings are still first choice the world over . . . with their number pushing the three-quarter million mark!

Whatever your coupling applications, this reputation is your guarantee of proved protection against costly shutdowns! Fast's Couplings give you *rugged construction* . . . because their original design has been maintained without basic change or sacrifice in size or materials. Fast's Couplings give you *lowest cost per year* . . . because they usually outlast the equipment they connect. And Fast's Couplings give you the benefit of Koppers *free* engineering service . . . assuring you of the right coupling for any job and the right solutions to tough coupling problems.

Write today for full details on Fast's Couplings and Koppers Engineering Service to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.,* 381 Scott Street., Baltimore 3, Maryland.

KOPPERS

THE ORIGINAL

FAST'S Couplings

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE, MD. This Koppers Division also supplies industry with American Hammered Industrial Piston and Sealing Rings, Koppers-Elex Electrostatic Precipitators, Aeromaster Fans and Gas Apparatus.

Engineered **Products Sold with** *Service*

KOPPERS COMPANY, INC., *Fast's Coupling Dept.,* **381 Scott St., Baltimore 3, Md.**

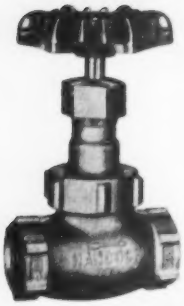
Gentlemen: Send me a Fast's Catalog giving detailed descriptions, engineering drawings, capacity tables and photographs.

Name .....

Company .....

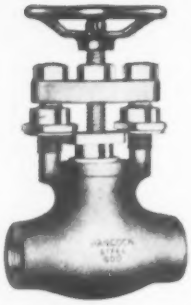
Address .....

City ..... **Zone** ..... **State** .....



150#, 200# and 300# Bronze Globe, Angle and Check Valves

800# Steel Gate Weldvalves



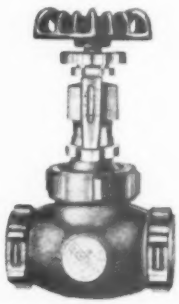
600# Steel Globe and Angle Weldvalves

1500# and 2500# Steel Globe and Angle Weldvalves

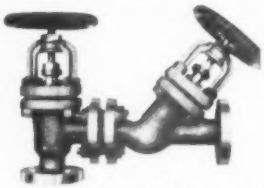
there's a

HANCOCK VALVE

FOR YOUR TOUGHEST SERVICE REQUIREMENTS



150# and 300# Bronze and 600# Steel "Flocontrol" Valves



300#, 600#, 1500# and 2500# Boiler Blow-Off Valves

Illustrated are some of the many fine Hancock Valves that contribute substantially to the high efficiency of plant operation and the low cost of valve maintenance. By anticipating the changing needs of expanding industry, Hancock has — since 1877 — pioneered the development of many different types of valves. Today, the outstanding quality and superior performance of Hancock Valves continue to surpass practically every job requirement, regardless of the demands of service. Yet, despite their long, trouble-free life, Hancock Valves cost no more than ordinary valves.

When Hancocks go in, valve costs go down

600# through 1500# Hi-Pressure Drop Weldvalves

300# and 600# Cast Steel Globe, Angle and Check Valves

FAST SERVICE IS YOURS through your nearby Industrial Supply Distributor. He stocks a wide selection of Hancock Valves to meet the diverse requirements of all industry. You can rely on his recommendations to help you obtain the best valves for your applications.

HANCOCK VALVES

A product of **MANNING, MAXWELL & MOORE, INC.** Watertown 72, Massachusetts

MAKERS OF 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

ASPHALT ANALYSIS—7

What Is Asphalt Composition?

by R. N. Traxler* and H. E. Schweyer†

DATA given in Table 2 of Installment 6 of this series show that the component analysis of asphalts recovered by the Abson[2] method is similar to that of the original asphalt. In the Abson recovery method the asphalt is dissolved in benzene and the solvent removed by careful distillation at atmospheric pressure in an atmosphere of carbon dioxide.

Although little is known concerning the actual composition of the component fractions, it is possible to theorize about the compounds present on the basis of the work of others. The asphaltic fractions apparently contain the high-molecular-weight materials having high densities and high Ring and Ball softening points, 93.3° to 176.7° C. (200° to 350° F.). The more highly condensed or polymerized cyclic compounds (naphthenic and aromatic) with or without side chains should be present in this fraction.

Condensed nuclei? . . . As has been pointed out by Garner[3] and others, it is quite doubtful that the high-molecular-weight materials are present as condensed nuclei. This conclusion is based on the fact that such a compound as decacyclene has a carbon-hydrogen ratio of 24 but a molecular weight of only 450. The molecular weights of asphaltic materials apparently are considerably higher but the carbon-hydrogen ratios instead of being higher than 24 to 1 are considerably less.

Other evidence refuting the condensed nuclei concept of high-molecular-weight asphaltic material is the fact that pure polycyclic materials of high molecular weight are insoluble in the common solvents employed for asphalts. Both the above deductions, however, do not preclude the presence of small amounts of high-molecular-weight nuclei since small quantities would not greatly affect the carbon-hydrogen ratio and also could be made to dissolve in the common solvents for asphalt through a mutual solubilizing effect produced by the next lower-molecular-weight asphaltic materials that are present. In fact, Hillman and Barnett[4] report that picene was actually isolated from a California cracked residue.

*The Texas Co., Port Neches, Tex. †University of Florida, Gainesville. Paper was presented at A.C.S. petroleum division symposium.

Sulfur content . . . Where the material is high in sulfur it usually is also high in nitrogen. The compounds containing these elements as bridge linkages, or as rings (thiophene and pyridine type) apparently concentrate in the asphaltic fraction as shown in Table 1; this is in agreement with the work of Thurston and Knowles.[13] The volatile resins of Sachanen,[11] which are considered by that author to contain some of the oxygen and sulfur compounds, are expected to be present in the asphaltic fraction. In addition, the higher-molecular-weight, higher-melting-point paraffinic materials, insoluble in n-butanol at 122° F., will also appear in the asphaltic fraction.

Oils . . . As has been pointed out above, the oils present in the paraffinic and cyclic fractions are of similar composition to those in lubricating oils, but of higher molecular weight. Except for possibly those asphalts containing appreciable quantities of wax, the oils contain few straight-chain paraffin hydrocarbons. It would be possible for oils boiling in the range of those considered here to include the relatively low melting and more soluble iso-paraffins, but most evidence indicates that such compounds are not present.

Varteressian and Fenske, and Smith are quoted by Sachanen to have stated that there are 1.5 rings per molecule in paraffin-base lube oils and up to 4.5 rings per molecule in asphalt-base oils which indicates the relative "cyclicity" of the asphaltic type. Sachanen discusses the evidence for the predominance of five and six-membered carbon rings in lubricating oils. Unsaturated hydrocarbons usually are not present in lube oils although they may be found in cracked products, and, therefore, may be present in some asphalts as a result of decomposition.

Oil compositions . . . In general, the oily fractions in asphaltic materials may be considered to be polycyclic naphthenes and aromatics; compounds of each type may be of varied paraffinicity depending upon the length and type of side chains which produce materials showing large changes in viscosity with change in temperature. The aromatics may comprise from 10 to 40 per cent of the oil or higher since Hillman and Barnett[4] have indicated a predominance of aromatic rings over naphthenic rings in California base oil.

The presence of polycyclic aromatics in the cyclics component is also indicated by the high densities found for the cyclic fraction. Component analysis of pressure-still residues shows a high cyclic content and high refractive index which indicates their aromaticity as expected since cracked residues from lube oils yield derivatives of naphthalene, anthracene, and phenanthrene as discussed by Sachanen.

Conclusions . . . The use of the above methods in asphalt technology have been more elucidative than most of the procedures that have been used in the past. Additional progress can be made by further fractionation of the three major components if necessary or desired by using methods that have been proposed by O'Donnel[9] and others. Component analysis by itself offers valuable information concerning the uniformity and behavior of asphaltic materials. It should be of still greater value when correlated with studies of the colloidal properties and rheological characteristics of bituminous substances.

Acknowledgment

The assistance of J. W. Romberg in the experimental work and in preparing the manuscript is gratefully acknowledged.

TABLE 1—SULFUR DISTRIBUTION IN COMPONENTS OF ASPHALTIC RESIDUA

Residuum	Number	Sulfur content, per cent				
		Asphaltics	Paraffinics	Cyclics	Total*	Residuum
A	329	1.23	0.49	1.21	0.74	0.70
B	330	5.97	2.80	5.47	4.64	4.71
C	324-A	7.62	4.09	5.72	6.01	6.14

*Computed from amount of each component and its sulfur content.

References

1. Abraham, H., "Asphalts and Allied Substances," fifth edition, p. 1224, New York, D. Van Nostrand Co., Inc., 1945.
2. Abson, G., Proc. A.S.T.M., 33, II, 704 (1933).
3. Garner, E. H., J. Inst. Petroleum Tech., 24, 496 (1938).
4. Hillman, E. S., and Barnett, B., Proc. A.S.T.M., 37, II, 559 (1937).
5. Hoiberg, A. J., and Garris, W. E., Ind. Eng. Chem., Anal. Ed., 16, 294 (1944).
6. Knowles, E. C., private communication.
7. Knowles, E. C., and Levin, H., Ind. Eng. Chem., Anal. Ed., 13, 314 (1941).
8. Knowles, E. C., Eckert, G. W., McCoy, F. C., and Weetman, B. Presented at 117th meeting A.C.S., Houston, March 26-30, 1950.
9. O'Donnell, G. Anal. Chem. 23, 894 (1951).
10. Pfeiffer, J. P., "The Properties of Asphaltic Bitumen," New York, Elsevier Publishing Co., Inc., 1950.
11. Sachanen, A. N., "The Chemical Constituents of Petroleum," New York, Reinhold Publishing Corp., 1945.
12. Schweyer, H. E., and Brown, O. M., Petroleum Processing, February 1950.
13. Thurston, R. R., and Knowles, E. C., Ind. Eng. Chem., 28, 88 (1936).

No Need to Pay Extra for Monel Orifice Plates Like These — You can now get them from Odex at a price comparable to ordinary high alloy steels in either the universal or paddle shapes to fit standard meters. With Monel you can maintain accurate meter readings for longer periods under most conditions. Additional information and prices are available on request from Odex Engineering & Equipment Co., 1410 N. Grant, Odessa, Texas.

When you want accurate flow metering.....

"Keep your eye on the doughnut

and not on the hole"

It's the orifice that establishes a flow meter reading, of course.

But it's the orifice plate . . . the "doughnut" . . . that establishes the accuracy you want. When a plate is eroded or corroded, the hole is distorted. So is the accuracy of the reading.

One of the best means you have to limit erosion and corrosion of orifice plates by fast-moving fluids and gases is to use Monel®. Monel has proved itself time and time again throughout the petroleum industry. You probably know of many instances in your own experience.

But you may not know that *you can now specify Monel orifice plates for your equipment without paying a premium.* Odex Engineering & Equipment Company of Odessa, Texas, supplies Monel orifice plates, manufactured to AGA standards or specifications of user, at the same price as ordinary plates. Stocks are on hand, and delivery, in West Texas, is immediate. Use them whenever you need high accuracy.

Monel and other Inco Nickel Alloys solve many corrosion problems in petroleum drilling and processing. They may prove to be just what you are looking for. So call in Inco whenever you need a better metal.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street New York 5, N. Y.

Inco Nickel Alloys

INCO

Monel . . . *your partner in progress*

h_f HEAT TRANSFER

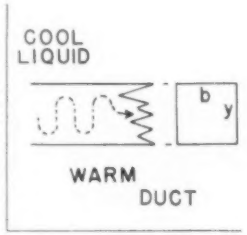
Part 49 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of HOT DUCT and COOL LIQUID

Liquid Movement: Turbulent

Special Consideration: Liquids of low viscosity



EQUATION:

$$h_f = 0.023 \frac{k}{D_e}\left[\frac{D_e G}{\mu}\right]^{0.8}\left[\frac{C_p \mu}{k}\right]^{0.4}$$

TERMINOLOGY:

- h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. °F.
- k - Thermal conductivity, BTU/hr. sq. ft. °F./ft.
- D_e - Equivalent diameter = 4 r_h = 2 by/(b + y), ft.
- b - Width of duct, ft.
- y - Depth of duct, ft.
- G - Mass velocity, lb./hr. sq. ft.
- μ - Viscosity, lb./hr.ft.
- C - Specific heat, BTU/lb. °F.

LIMITATIONS:

$1 < b/y < 7.9$

$D_e G/\mu > 30{,}000$

Accuracy: ± 15%

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for
- μ -- 370-374, 1198, 1696.
- ρ -- 130-148, 175-195, 1683.
- k -- 459-461, 1303, 1697.
- C -- 225-235, 297, 1688, 1696.

REFERENCES:

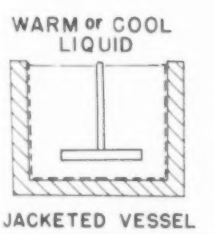
1. Heat Transmission, W. H. McAdams, McGraw-Hill Book Company, New York, 1942, p. 197.

U 5 c

COEFFICIENT of HEAT TRANSFER through FILM between JACKET of JACKETED VESSEL and LIQUID

Liquid Movement: Turbulent

Direction of Heat Movement: Heating or Cooling



EQUATION:

$$h_f = 0.36 \frac{k}{D_j}\left[\frac{C\mu}{k}\right]^{\frac{1}{3}}\left[\frac{\mu}{\mu_j}\right]^{0.14}\left[\frac{L^2 N \rho}{\mu}\right]^{\frac{2}{3}}$$

TERMINOLOGY:

- h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.
- k - Thermal conductivity, BTU/hr.sq.ft.°F./ft.
- D_j - Inside diameter of jacket, ft.
- μ - Viscosity at average liquid temperature, lb./hr.ft.
- μ_j - Viscosity at jacket temperature, lb./hr.ft.
- L - Length of paddle, ft.
- N - Agitator speed, r.p.h.
- ρ - Density of liquid at average temperature, lb./cu.ft.
- C - Specific heat of liquid at average temperature, BTU/lb. °F.

LIMITATIONS:

Used when coil is immersed in agitated liquid in jacketed vessel.
Applicable to agitation by flat paddle only.
Recommended for use with vessels of less than 9 ft. diameter only.

$$400{,}000 > \left[\frac{L^2 N \rho}{\mu}\right] > 100$$

$L > 0.3 D_j$

Height of paddle from bottom $< L/6$

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity, and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for
- ρ -- 130-148, 175-195, 1683.
- μ -- 370-374, 1198, 1696.
- K -- 459-461, 1303, 1697.
- C -- 225-235, 297, 1688, 1696.

REFERENCES:

1. T. K. Chilton, T. B. Drew, H. H. Jebens, Ind. & Eng. Chem., 36, 511 (1944).

2. Process Heat Transfer, Kern, pp. 718-719.

V 2,5 c

END OF SERIES . . . This is the final installment in the current series on Heat Transfer. Other installments appeared as follows:

Film Coefficients . . .

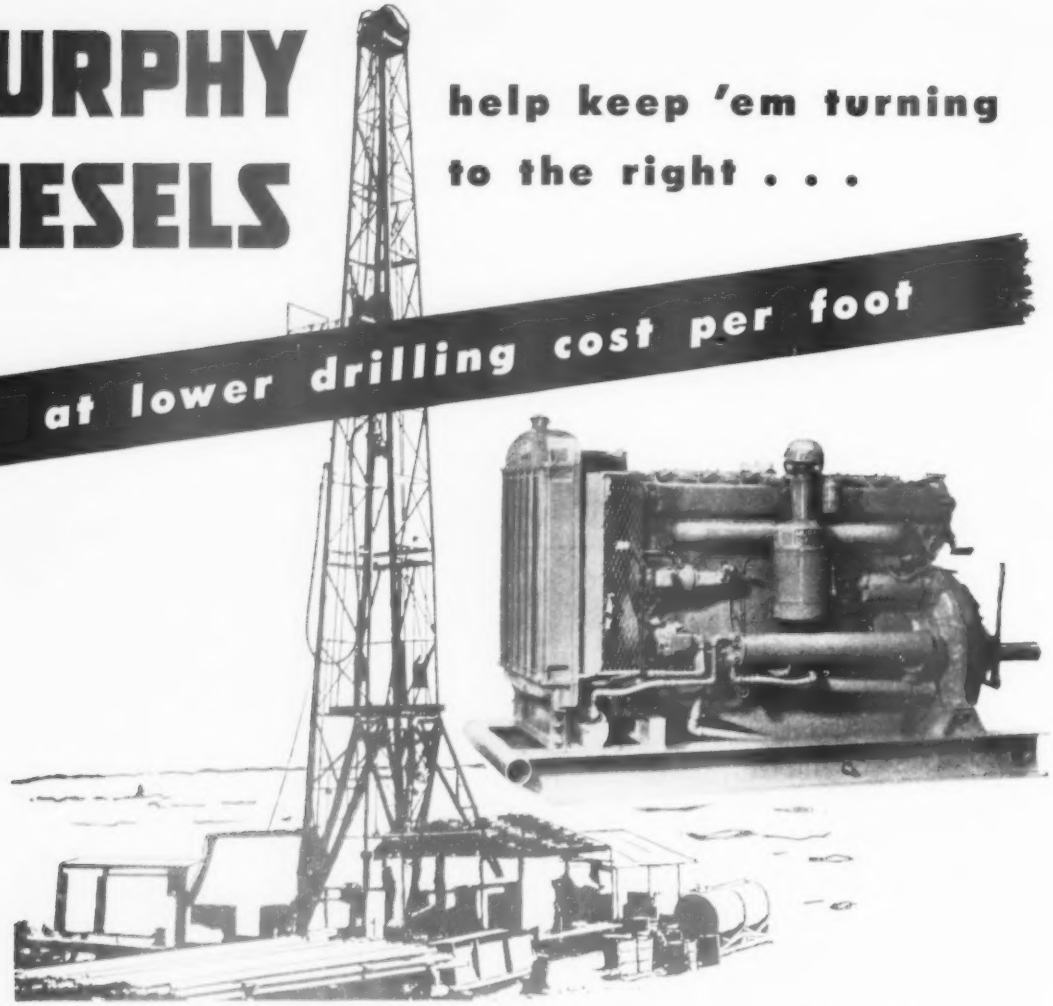
1. Vertical Walls, 8-18-52, p. 157.
2. Vertical Walls, 8-25-52, p. 155.
3. Vertical Walls, 9-1-52, p. 119.
4. Vertical Walls, 9-8-52, p. 131.
5. Horizontal Walls, 9-15-52, p. 139.
6. Horizontal Walls, 9-22-52, p. 143.
7. Horizontal Walls, 9-29-52, p. 317.
8. Horizontal Walls, 10-6-52, p. 139.
9. Parallel Flat Surfaces, 10-27-52, p. 143.
10. Parallel Flat Surfaces, 11-3-52, p. 132.
11. Parallel Flat Surfaces, 11-10-52, p. 161.
12. Inside of Tubes, 11-17-52, p. 425.
13. Inside of Tubes, 11-24-52, p. 143.
14. Inside Surface of Vertical Tube, 12-1-52, p. 155.
15. Inside Surface of Vertical Tube, 12-8-52, p. 133.
16. Inside Vertical Walls, 12-15-52, p. 148.
17. Inside Warm Tubes, 12-29-52, p. 104.
18. Warm Tube and Cool Liquid, 1-5-53, p. 82.
19. Tube to Boiling Liquid, 1-12-53, p. 129.
20. Tube Surface to Warm Fluid, 1-19-53, p. 133.
21. Inside Tube Surface to Fluid, 1-26-53, p. 400.
22. Warm Tube to Cool Fluid, 2-2-53, p. 103.
23. Warm Tube to Cool Liquid, 2-9-53, p. 139.
24. Outside Tube Surface to Fluid, 2-16-53, p. 178.
25. Outside Tube to Fluid, 2-23-53, p. 203.
26. Outside Tube to Warm Fluid, 3-2-53, p. 101.
27. Outside Tube Surface to Fluid, 3-9-53, p. 128.
28. Outside Tube Surface to Warm Gas, 3-16-53, p. 153.
29. Outside Tube Surface to Warm Gas, 3-30-53, p. 198.
30. Tube to Warm Fluid, 4-13-53, p. 149.
31. Tube to Fluid, 4-20-53, p. 164.
32. Warm Tube to Liquid, 4-27-53, p. 296.
33. Outside Tubes to Warm Fluid, 5-4-53, p. 143.
34. Outside Tubes to Cool Fluid, 6-15-53, p. 153.
35. Outside Tube to Warm Gas, 6-22-53, p. 335.
36. Cool Tubes to Warm Liquid, 6-29-53, p. 109.
37. Outside Tubes to Condensing Vapor, 7-20-53, p. 140.
38. Inside and Outside Coil to Gas and Liquid, 7-27-53, p. 361.
39. Outside Coil and Liquid, 8-3-53, p. 101.
40. Finned Tube and Gas or Liquid, 8-10-53, p. 132.
41. Fluids to Spheres, 8-24-53, p. 153.
42. Granular Solid and Gas, 9-7-53, p. 127.
43. Gas or Liquid to Tube of Streamline Shape, 9-21-53, p. 348.
44. Gas to Tube, 9-28-53, p. 146.
45. Tube to Fluid, 10-5-53, p. 301.
46. Tube to Fluid, 10-12-53, p. 171.
47. Tube to Fluid, 10-19-53, p. 159.
48. Inside Ducts to Fluid, 10-26-53, p. 153.

YES, this series is being reprinted. Write at once to the Editorial Department, The Oil and Gas Journal, P. O. Box 1260, Tulsa, Oklahoma. Price is $1.00 per copy.

MURPHY DIESELS

help keep 'em turning to the right . . .

at lower drilling cost per foot



IT'S straight-ahead drilling with a Murphy on the job. Easier starting . . . better response . . . dependable lugging power and longer life add up to making hole easier, faster.

Add to this the lower fuel cost per horsepower resulting from Murphy's Unit Fuel Injector in combination with "True" diesel efficiency and you come up with a minimum drilling cost per foot.

Find out more why Murphy Diesel power can increase your drilling profits. Ask your Murphy dealer for a copy of "10 Reasons Why Your Next Engine Should Be a Murphy," or write direct.

MURPHY DIESEL COMPANY

5305 W. Burnham St., Milwaukee 14, Wisconsin

FACTORY BRANCH—Sales, Parts and Service: 113-117 South Elwood Street, Tulsa, Oklahoma

Murphy Diesel engines and power units 90 to 260 H.P.;

278 **Dual-Fuel engines 135 to 215 H.P.; Generator Sets 60 to 140 K.W.**

MURPHY DIESEL

SEE YOUR MURPHY DIESEL DEALER, TODAY—

Albuquerque, New Mexico
Lively Equipment Company
Butte, Montana
Hall-Perry Machinery Co.
Corpus Christi, Texas
Houston Engine & Pump Company
Dallas, Texas
Conley-Lott-Nichols Machinery Co.
Denver, Colorado
Constructors Equipment Company
Edmonton, Alberta, Canada
Northern Engine & Equipment Co., Ltd.
San Antonio, Texas
J. E. Ingram Equipment Co.
Great Bend, Kansas
Manufacturers Dist. Co.
Great Falls, Montana
Hall-Perry Machinery Company
Houston, Texas
Houston Engine & Pump Co., Inc.
Jackson, Michigan
Utility & Industrial Supply Co.
Los Angeles, California
Industrial Engine Service
Lubbock, Texas
Conley-Lott-Nichols Machinery Co.
Glenn Rose Engine Service
502 South Real Road
Bakersfield, California

SALES, PARTS AND SERVICE, 113-117 S. ELWOOD STREET, TULSA, OKLAHOMA

EQUIPMENT MEN . . . in the News

Schwab to Aid France in Oil Pressure Well Completion

Carl Schwab, service administrative manager of Otis Pressure Control, Inc., Dallas, arrived in Paris in early October to assist the government-owned Societe Nationale Des Petroles D'Aquitaine in the completion of a high-pressure gas well. Schwab will supervise the French in the installation of various safety devices—surface safety valves, tubing safety valves, bottom-hole regulators, and an input safety valve—in the completion of the well.

This well is located in southwestern France, and was drilled to a total depth of 12,000 ft. where a high-pressure formation was encountered.

Schwab will be some 30 days at this well, as he will advise the French company in its testing operations following completion of the well. He will later travel to Italy and Germany to visit officies and field installations in those countries. Among the companies he will visit are Azienda Generale Italiana Petroli, at Cortemaggoire, Italy, and Gewerkschaft Elwerath in Germany.

Du Pont Names Gest to West Coast District

W. B. GEST

The appointment of William B. Gest as the new assistant manager for the West Coast district of the petroleum-chemicals division of E. I. du Pont de Nemours & Co., Inc., was announced recently. He formerly was technical assistant to the director of sales in Wilmington, Del. He will report to George L. Tyler, manager of the West Coast district, with headquarters in Los Angeles.

Gest began with Du Pont in 1941 as a foreman at the Kankakee, Ill., ordnance works. Later that year he was transferred to the company's affiliate, Remington Arms Co., Kings Mills, Ohio, as industrial engineer. From 1945 to 1947 he was assigned to industrial-engineering work for the engineering department at various Du Pont plants. He joined the petroleum-chemicals division in 1947 at the time it was formed and has been a sales service representative in Chicago, Toledo, and Houston.

Kelley Manufacturing Names Lea, Reese

John S. Lea has been named general sales manager of Kelley Manufacturing Co., James L. Whitcomb, executive vice president and general manager, has announced. George Reese has been appointed to the position of steel warehousing sales manager.

JOHN S. LEA

GEORGE REESE

Lea was sales manager of the F. W. Heitmann Co. for a number of years before joining the Kelley organization.

Reese is a veteran of more than 30 years with Kelley. His new position has recently been created to facilitate the sales of jobbing items and of manufactured goods sold from warehouse stocks at Kelley. In addition, Reese will continue to be responsible for warehousing operations and traffic matters, both in Houston and in branch warehouses.

Tube Turns Adds Grant, Chronister to Sales Staff

Two sales-engineering representatives have been added to the staff of Tube Turns, Inc., Louisville. They are Bert Grant, assigned to the Pittsburgh office, and Clyde Chronister, assigned to the Tulsa office.

Grant was formerly associated with Capital Airlines, Associated Investment Corp., and Williams & Co. He joined Tube Turns in July 1953. He will make his headquarters in Cleveland.

Chronister was Orbit Valve Co.'s representative east of the Mississippi, prior to becoming associated with Tube Turns in June 1953.

Flanders on South American Trip for Lane-Wells Co.

The outlook for increased South and Central American oil production is excellent, according to George Flanders, Lane-Wells Co. export sales engineer, who is winding up a 3-month trip through Latin America. Leaving Los Angeles early in August, Flanders' itinerary carries him through Mexico and Panama to Colombia, Venezuela, Trinidad, Brazil, Argentina, Peru and Ecuador before his return the end of October.

While the trip was undertaken primarily in the interests of service to the many customers of Lane-Wells and Petro-Tech Service, Flanders has talked at length with business men and government officials in several countries, and reports many encouraging indications of increased oil activity throughout Latin America.

McCullough Names Watson Head Dallas Sales Office

McCullough Tool Co. recently opened a new sales office in Dallas. The new office, in charge of John W. Watson, will service the oil industry in the Dallas-Fort Worth area.

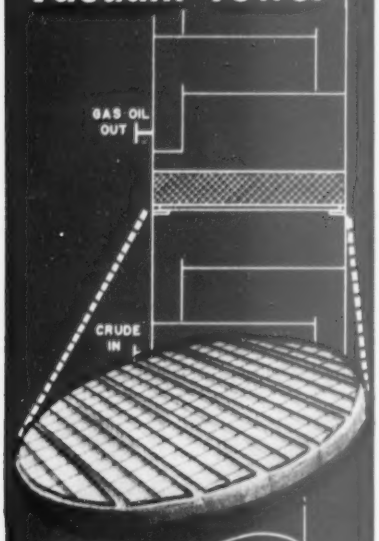
Watson joined McCullough Tool Co. in June 1951. Prior to that he had been associated with Gulf Oil Corp. Before his appointment to the new Dallas office, Watson was a sales engineer working out of the eastern division headquarters at Houston. He is a graduate of Texas A. & M.

Ansul Chemical Co. Announces New Opening

Ansul Chemical Co. opened a new office and warehouse at Kansas City, Mo., in early October. The new building is headquarters for the sale of the company's dry-chemical fire equipment, refrigeration products, and industrial chemicals in the Southwest. Territory to be serviced includes Missouri, Kansas, Nebraska, southern Illinois, Arkansas, Oklahoma, and the Texas Panhandle.

Supervising the operations of the

This YORKMESH DEMISTER means Clean Separation in a Vacuum Tower



RESULT:
Cleaner gas oil with reduction in carbon and metals contamination which means increased yield of higher octane gasoline from your cat cracker.

For installation in—

LUBE VACUUM TOWERS
DISTILLATION EQUIPMENT
GAS ABSORBERS
SCRUBBERS
SEPARATORS
EVAPORATORS
KNOCK-OUT DRUMS
etc.

Send today for Catalog 13

OTTO H. YORK Co., INC.

77 Glenwood Place, E. Orange, N. J.

new 10,000-sq. ft. building are C. H. Armstrong, regional fire-equipment manager, and Roy McCrady, refrigeration district manager. Robert Brewer and Thomas Gorman assist Armstrong.

Holbert, Cross Named to New Posts by Johnston Pump

C. L. Holbert and Rex D. Cross have been appointed to new positions with Johnston Pump Co., of Pasadena, Calif., according to an announcement made by the firm recently.

C. L. HOLBERT

REX D. CROSS

Holbert, formerly vice president-treasurer, has been named vice president-general manager. Cross, who was district sales manager, southeastern states, takes over as national sales manager. Both men have been associated with the pump-manufacturing industry for many years at Johnston and other firms.

Fetzer Gets Continental Post at Calgary

E. M. FETZER

Earl M. Fetzer has been appointed managing director of The Continental Supply Co., Ltd., with headquarters in Calgary, Alta., Canada. The announcement was made recently in Calgary by F. I. Brinegar, executive vice president of The Continental Supply Co., Dallas.

Fetzer succeeds J. H. (Jack) Berry, who resigned to become managing director of Devon Drilling Co., Ltd.

Fetzer joined Continental following his graduation from Oklahoma A. & M. College with a degree in mechanical engineering in 1929. He has had extensive experience in practically all areas of the United States and Canada. He was manager of the production equipment division of the parent company for 12 years prior to his transfer to the Canadian company in the same capacity in January of this year.

Kaiser Steel Names Kluthe To Mid-Continent Sales

Paul Kluthe has joined the Mid-Continent district sales offices of Kaiser Steel Corp. He was formerly associated with Kaiser's central district sales staff in Oakland, Calif. His headquarters will be in Tulsa. Kluthe comes to the Mid-Continent district with a thorough background in large-diameter pipe sales. In addition to his Oakland sales experience, he recently completed a full training program at Kaiser's Fontan, Calif., mill, and the Basalt-Kaiser large-diameter pipe operation in Napa, Calif.

Baash-Ross Assigns Garrett To Farmington, N. M. Area

H. L. GARRETT

J. L. Barnett, Baash-Ross Tool Co. district sales manager for West Texas and New Mexico, has advised that H. L. Garrett, sales representative, has been assigned to cover the steadily increasing field activities in the "Four Corner" area of New Mexico, Colorado, Utah, and Arizona.

Garrett has had extensive experience in oil-field work, first in field-construction operations and then for 5 years in sales work in the West Texas-New Mexico area where he is widely known. In addition to working his new territory, out of Farmington, N. M., Garrett will also cover other parts of the West Texas-New Mexico area out of the Baash-Ross plant in Odessa, Tex.

Oil Field Insurance Firm Organized in Dallas

P. H. Van Wagoner has announced the formation of P. H. Wagoner & Co., General Agents, with offices in Dallas. The new organization has been appointed by Universal Insurance Co. of New Jersey, managed by Talbot Bird & Co., with executive offices in New York City. They will specialize exclusively in physical damage insurance on oil-field drilling, servicing, exploration, and other types of oil-field equipment, offering a distinct service to its agents and oil-field contractors by personal inspection and appraisals of all equip-

Announcing

an important addition to a well-known line

STYLE 5

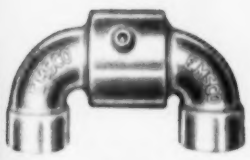
EMSCO

BALL BEARING

SWIVEL FITTINGS

STYLE 1

STYLE 2

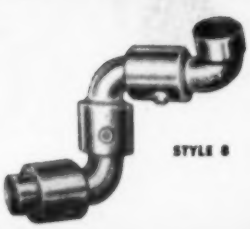


STYLE 3

STYLE 4

STYLE 6

STYLE 7



STYLE 8

EMSCO leadership in the oil equipment industry results from continuous research and development with the express purpose of providing new and better methods for doing field jobs faster, more efficiently and more economically. This search never ceases at EMSCO.

And so it has been with our entry into the field of ball bearing swivel fittings. Our research personnel, engineers and patent counsel carefully investigated many possibilities both in new designs and in the merits of time-proven designs which were available to us. As a result we acquired the long established and highly regarded ball bearing swivel fitting business of the Rasmussen Manufacturing Company of Hollydale, California. The excellence of this product, formerly known as RAMSCO—now to be known as EMSCO, has been proven by thousands of field installations.

Design superiority of the Emsco Ball Bearing Swivel Fittings assures exceptionally easy turning qualities because the load thrust is taken through ball bearings designed specifically to carry thrust loads. Several types of packing elements are available so that any type of product may be handled at extreme pressures or high vacuum, at sub-zero or high temperatures. Under field conditions these swivel fittings conform to Emsco's exacting standards.

With more than 500 various types, styles, and sizes to choose from, Emsco Swivel Fitting engineers and field representatives are ready to assist you in the selection of the correct swivel fittings for your problems.

We are indeed proud to present this product to the oil industry throughout the world.

EMSCO MANUFACTURING COMPANY

Houston, Tex. LOS ANGELES, CALIF. Garland, Tex.

HAS A GEAR TRAIN BUILT FOR LONG, SUSTAINED PULLS

THE GEAR TRAIN of the Carco GO winch is engineered for the long, sustained pulls found in oil field and pipeline work. As a result, you can pull with a Carco GO winch for indefinite periods without the gear train producing excess heat. This is only one of the reasons why Carco GO winches are giving such outstanding performances for pipeliners and oil field operators. Another and even more vital reason is that the Carco GO winch was specifically designed for oil field and pipeline work. That's why it's built with large drum capacity, automatic brake and two speeds forward and two reverse. One slow speed for the long, sustained pulls and another for lighter winching jobs. Roller type fairlead is easily attached. See your nearest Carco dealer. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Oregon, and Franklin Park, Illinois.

ment by staff engineers and handling of losses by staff personnel.

Van Wagoner has been identified with this field of insurance for the past 10 years as manager of Rig Insurance Underwriters, of Dallas.

Dowell Announces Three District Promotions

D. E. RAMSEY

Dowell Incorporated has promoted D. E. (Pat) Ramsey to district manager of the company's Midland, Tex., district serving West Texas, according to a recent announcement by A. C. Polk, vice president and general manager. Polk has also announced the promotion of Earl J. Davis to district area manager of Dowell's Salem, Ill., district, and Fred E. Rugg to district petroleum engineer of the Oklahoma City district.

Ramsey fills the position formerly held by Ralph H. Smith, who has been named Dowell director of sales in Tulsa. Ramsey joined Dowell at Hobbs, N. M., as a service engineer, shortly after his graduation from Texas A. & M. in 1948. Subsequent transfers took him to Dowell stations at Levelland and Kermit, Tex. He returned to Hobbs in July 1950 as station manager. He became a sales engineer in 1951. Ramsey was named district engineer in 1952, which position he held until his recent promotion.

E. J. DAVIS

F. E. RUGG

Davis joined Dowell in 1948 as a service engineer at Great Bend, Kans. In 1951 he was transferred to Dowell's general offices in Tulsa as a sales-development engineer. In June 1952 he was promoted to sales engineer.

Rugg was first employed by Dowell as a junior service engineer at Kermit, Tex. After serving at McCamey, Tex., he was promoted to development engineer in the Dowell general offices in Tulsa in 1952. Rugg formerly worked as a field-survey party chief for El Paso Natural Gas Co., and as a field engineer for Sinclair Oil Co.

Iverson Names Niblack To Tulsa Sales Post

Marvin C. Niblack has been promoted from field salesman for Iverson Supply Co. in the Oklahoma City field to city sales representative in Tulsa, working directly from the Iverson central office. Before joining Iverson in 1946, Niblack had been associated with International and Bethlehem Supply companies.

CF&I Opens Seamless Tube Mill at Pueblo, Colo.

The Colorado Fuel & Iron Corp. recently opened its new 30-million-dollar seamless tube mill at Pueblo, Colo. The new mill will be an important supplier of seamless-steel tubing and casing to the oil and gas industries of the western United States and Canada, according to Charles Allen, Jr., chairman of the board of directors of C. F. & I.

The ultramodern new industrial structure covers more than 10 acres under one roof, including billet yard and pipe storage. A. F. Franz, president of C. F. & I., stated that when full production is reached the mill will turn out over 150,000 net tons of seamless pipe a year.

A giant 70-ft. rotary furnace, one of the largest ever constructed for American industry, has been installed in the new mill. Carefully controlled, uniform heating of steel billets is vital to the production of quality seamless tube and pipe; this new revolving-hearth furnace is designed to give a maximum degree of accuracy and uniformity in the heating process.

Patterson Opens Tulsa District Sales Office

W. V. C. JACKSON

A new district sales office has been opened in Tulsa by Patterson Foundry & Machine Co., according to an announcement by Richard L. Cawood, president. W. V. C. Jackson, who has represented chemical-processing manufacturers in the Tulsa area for 24 years, has been named manager of the new district office.

The new Patterson office will pro-

Dutch industry makes American standard fasteners for the oil industry

QUALITY Five ultra-modern Dutch factories are banded together to produce the world-renowned VvS nuts and bolts made to American specifications. The fasteners industry of Holland has led in efficiency, dependability and precision for more than 100 years. The quality of Dutch VvS products is unsurpassed. Leading U. S. testing laboratories certify the quality of VvS products on *American standards* of metallurgy, dimensions and finish. For example, the oil industry in the United States and Canada is widely using Heat Treated and Oil Quenched VvS nuts. These products meet ASTM specifications A-194 of course, and are particularly outstanding in finish.

PRICE Dutch efficiency and dependability make it possible to supply VvS nuts anywhere in the world on a competitive basis. The oil industry has used fasteners from the VvS member factories since its very beginnings. American oil and gas industry purchasers of nuts, bolts and fasteners are invited to compare VvS price lists with any others.

DELIVERY VvS factory organizations take pride typical of the Dutch in their ability to meet delivery deadlines. Orders placed with Reynolds Fasteners, Inc., in America bring fast and dependable shipments from the stable VvS plants, where technician, craftsman and workman alike are given opportunities, incentives and working conditions ranking with the best Europe can offer. Plants and equipment facilities are being enlarged in pace with the steadily growing stream of business coming to VvS.

The exclusive Sales and Service Representative for VvS in the United States and Canada is

Reynolds FASTENERS, INC.

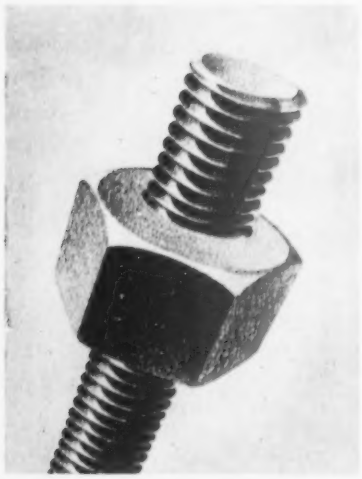
VvS

68 Wall Street
New York 5, N. Y.
Phone DIgby 4-7444
Cable REYNFAST, N. Y.

In Canada associated with
Kenway Metal Products, Ltd.
21 King Street East
Toronto 1, Ontario

(See next page)

Reynolds FASTENERS NEWS



ABSOLUTE QUALITY STANDARDS

VvS fasteners for the American oil and gas industries are produced strictly in line with ASTM standards as to metallurgy, dimensions, finish. Their qualities are verified by leading U. S. independent testing laboratories. American stud manufacturers are giving immediate and wide acceptance to VvS nuts of both Classes 2 and 2H. Their absolute quality is enhanced by unrivalled finish, including true washer surface and smooth outside surfaces, and a balanced hexagon shape.

VvS quality is the result of Dutch pre-eminence in the fasteners field. The VvS Heat Treated, Oil Quenched nuts are made on the famous Van Thiel hot pressing equipment, acknowledged to be one of the major advances in nut making. VvS craftsmen have the advantage of more than a decade of experience with this and other Dutch-developed equipment.

Currently Reynolds Fasteners is booking orders for VvS nuts in sizes of ¼-inch to 3½-inches. The VvS factories are equipped to supply the American market with *a complete range* of fasteners, including Hexagon Head Cap Screws in both 1020 and 1038 steel, in sizes from ¼-inch to 1½-inches; Hot Pressed Nuts from ¼-inch to 4 inches; Semi-Finished Nuts up to 4 inches; Machine Screws; Machine Screw Nuts; Socket Head Cap Screws, and other standard or special types of fasteners.

So diverse are the facilities of the five Dutch factories that inquiries on any type of nut, bolt or fastener are invited for study and prompt reply.

Do you know what Verkoopkantoor voor Schroefbouten N.V. means?

A workable translation for this marathon phrase, usually shortened to VvS, is *Combined Sales Organization of Bolt and Nut Factories in the Netherlands.*

VvS represents an alliance of virtually the entire Dutch bolt, nut and fasteners industry, a field in which the Netherlands has long been a leader. Five factories operate under the VvS banner, employing more than 2000 persons, each factory organization representing a modern, top-flight producer of fasteners. VvS means Sales and Service effectiveness, insurance of Quality and dependability of Delivery.

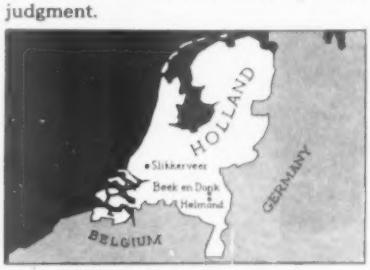
The combined sales efforts of the Dutch factories commenced in 1934. For nearly a score of years the teamwork of this precision industry group has earned for VvS the admiration and patronage of the most meticulous manufacturers and fabricators in the world.

ABOUT REYNOLDS FASTENERS, INC. As exclusive representatives for VvS in the United States and Canada, the Reynolds organization brings the American oil and gas industries a solid, nearby link between a pre-eminent supplier industry abroad and the men who establish the requirements and standards for equipment for oil fields, refineries, oil and gas process installations, storage, pipe lines, and distribution. American oil and gas facilities are designed to be the best anywhere. It is to this level of quality that VvS has gauged its production of American standard fasteners.

Reynolds personnel are well grounded technically, intimately informed and up-to-date on the qualifications of the VvS member factories and people. Moreover, the Reynolds people are experts in handling the import of precision products. Reynolds is an affiliate of long established firms which for years have specialized in the import of precision metal and engineering products—the best the world offers for American industry. Reynolds offices in New York, Toronto, Paris and The Hague provide sales and technical services for American fasteners applications anywhere in the world. The Reynolds staff is well qualified for rapid, accurate handling of mill orders which bring shipments direct from European ports to the North American ports of entry and railheads for suppliers to the oil and gas industries.

GETTING IN TOUCH WITH REYNOLDS Your inquiries as to details on VvS fastener products for your individual needs should be addressed to Reynolds Vice President for Sales, Mr. Binem Krygier, at the New York office. Mr. Krygier, a widely experienced and informed engineer, and his staff travel frequently in the oil and industrial capitals of the U. S. and Canada. They will schedule a visit to your office on one of the sales and service itineraries, at your convenience.

ABOUT PRICES Any buyer is very much interested in prices and in the case of items produced abroad wants to know why Dutch-made specialty products offer advantages of their own. Price-wise Reynolds believes the VvS products compete with the best. Further, the exclusive machinery and methods of the Dutch give a particularly accurate and beautifully finished product. The Dutch toolmakers of VvS can't be beat for advanced design and efficiency. If the prices are right, there just isn't any question about quality or delivery. VvS goes to work on a stable, agreed schedule of production and shipments. Reynolds experience with American customers will be laid before you for judgment.



Headquarters of VvS are at Helmond, Holland, where two of the factories are located; the other three factories are at Beek en Donk and Slikkerveer (see map sketch). VvS officials welcome visits of American industrialists at Helmond if you are traveling abroad. Let them know you are coming to see VvS showrooms and headquarters through Reynolds Fasteners, Inc.

REYNOLDS FASTENERS, INC. • 68 WALL STREET • NEW YORK 5, N. Y. • PHONE DIGBY 4-7444

vide specialized service to the petroleum, chemical, and allied industries in Oklahoma, Texas Panhandle, and southeastern Kansas.

Burgess-Manning Assigns Oliver to Chicago Post

R. T. OLIVER

R. T. Oliver, Jr., has been assigned to the Chicago sales territory by Burgess - Manning Co., as announced by S. G. Paddock, sales manager of the Dallas division.

Oliver joined Burgess - Manning sales division at Dallas in 1951. He was graduated from University of Illinois in 1949 with a bachelor of science degree.

The Dallas headquarters of Burgess-Manning is one of the three divisions of the company which has specialized for many years in research and development of improved silencing devices and pulsation snubbers, which are used in the petroleum and chemical fields.

Daffin In Middle East as Production Adviser for Otis

Douglas Edward Daffin, service operations manager of Otis Pressure Control, Dallas, is in the Middle East oil fields where he is helping American oil companies with production problems.

Daffin is assisting Arabian-American Oil Co. in Saudi Arabia in the servicing of Otis equipment in Abqaiq field. He will then go to Kuwait to work with Kuwait Oil Co. (Ltd.) along similar lines.

Associated Equipment, Inc. Announces Appointments

J. Daviss Collett, president of the newly organized Houston firm of Associated Equipment, Inc., has announced the appointment of sales and service representatives for the company's new sonic fluid-level recorder.

Bill Harmon, owner of Diamond Coring Service, will cover Illinois, operating from Carmi, Ill. In Canada the firm has appointed Bennett & Burns in Regina, Sask., while Chemical & Geological Laboratories, Inc., was appointed to cover the Rocky Mountain area.

Here's the key—

TO A "FREE" TUBING STRING

SAME O. D. AS TUBING COUPLING
LEFT-HAND SQUARE THREADS RELEASE EASILY AND POSITIVELY
OIL-RESISTANT THREAD SEAL
"FULL-BORE" SAME I. D. AS TUBING
Product No. 441

You need never worry about freeing your tubing from packers and other devices that sometimes freeze in the hole after prolonged periods of use—not if you've taken the precaution to install a Baker Safety Joint strategically in your tubing string.

BAKER SAFETY JOINT

A few turns to the right unscrews the Baker Safety Joint, freeing your tubing quickly and easily. And you just don't worry about the Baker Safety Joint ever freezing or sticking. It is especially designed to unscrew easily even after long periods of sub-surface exposure.

Precision-matched *left-hand* square threads are of the exact tolerance and taper to ensure positive breaking of the joint. The tough, oil-resistant thread seal effectively protects these threads from corrosive fluids.

YOUR SUPPLY STORE has BAKER SAFETY JOINTS in stock, or will get them for you promptly.

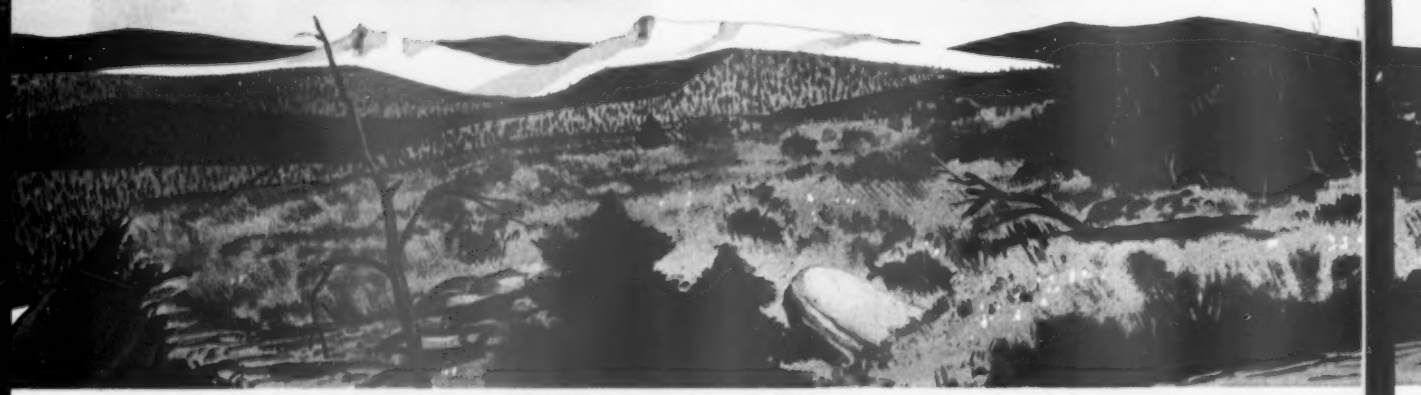
BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK

No. 3 OF A SERIES

The manufacture-supply-service industry gives the oil industry the ultimate in....

APPLIED

It took the world's greatest research and engineering brains to build the GIANT MECHANICAL HEART that keeps a three-mile-deep drilling well alive . . .

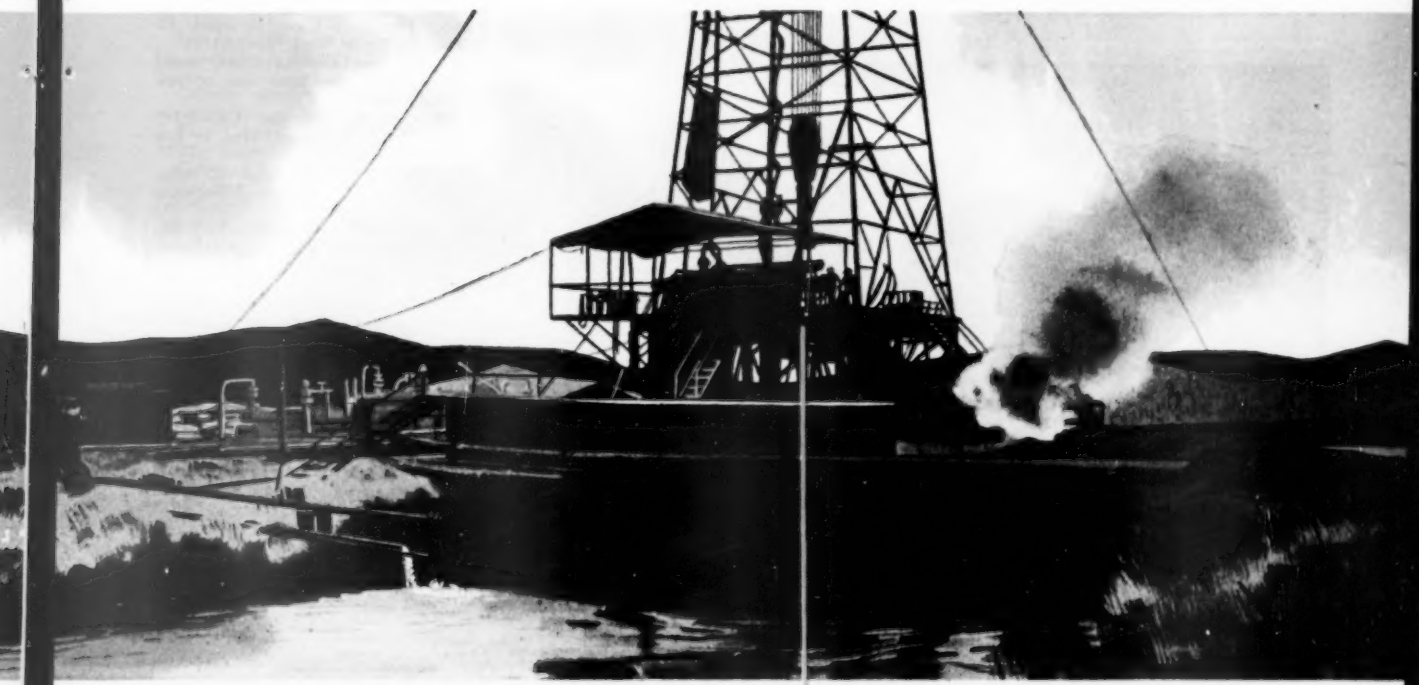


To build a slush pump that could keep the circulation going in a three-mile-deep well with pressures up to 3,000 pounds per square inch, and in lower pressures, in volumes up to 1,000 gallons per minute, has required practically every kind of technical knowledge.

This giant unfailing mechanical heart is the epitome of decades of study and experimenting by the combined engineering departments of leading manufacturers in the billion-dollar oil equipment business, working in the laboratories and in the oil fields. Brilliant research engineers, through these many years, have carried on: (1) experimental designing, and testing in experimental test pumps under various extreme conditions to obtain performance data; (2) field testing under actual drilling conditions. Using this data, designing engineers have, with indomitable persistence, solved problem after problem.

Yet, this giant mechanical heart could not have stood the extreme pressures, abrasive cutting, and shock, had not the science of metallurgy kept apace. Carefully controlled heat treating has resulted in the needed tougher, longer-lasting steels. Then came the manufacturing techniques using precision gauge blocks to calibrate the production gauges used in the mass production of pumps and pump parts with high uniformity in dimensions and surface finish.

SCIENTIFIC KNOWLEDGE



4473

Now, we see in every oil field these mechanical hearts keeping wells alive with little heart trouble and seldom heart failure. This triumph of engineering is repeated in many another oil industry product that receives the ULTIMATE IN APPLIED SCIENTIFIC KNOWLEDGE FROM THE 9,000 SCIENTISTS AND ENGINEERS OF THE PETROLEUM MANUFACTURE-SUPPLY-SERVICE INDUSTRY.

Result of this applied advanced knowledge: lower costs in exploration, drilling, producing, transporting.

MANUFACTURE · SUPPLY · SERVICE

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

Pipe-Line Construction

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **Cities Service Pipe Line Co.**—60 miles, 12-in., planned, Houston to Sour Lake, Tex.

R. A. Goodall.—45 miles, 6-in., under way, Little Beaver to Merino, Colo. (To connect with Sterling system).

• **Gulf Refining Co.**—55 miles, 12-in., planned. Bay Marchand to Plaquemines, La.

Gulf Refining Co.—63 miles, 8-10-in., under way, Lea County, New Mexico, to Anderson and Denton fields. 1-54.

Lakehead Pipe Line Co.—635 miles, 30-in., under way, Superior, Wis., to Sarnia, Ontario, Canada. Project managed by Bechtel Corp., Saginaw, Mich.

Superior to Wisconsin-Michigan state line. Mahoney Contr.

Mackinaw City to Red Oak, Mich. Bechtel Corp.

Red Oak via Bay City to International Boundary south of Port Huron on St. Clair River. Conyes Const.

Water crossings of Mackinaw, Saginaw, and St. Clair rivers. Merritt-Chapman & Scott Corp., W. J. Meagher & Sons, Inc., and Midwestern Constructors.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned. Midland County, Texas area.

Magnolia Pipe Line Co.—154 miles 16-in., under way, Corsicana to Ringgold, Tex. H. B. Zachry. Completion date 11-15-53.

Michi, Inc.—10-in., planned, Highland, Ind. to Kalamazoo, Alma, and Elsie, Mich.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., planned. Snyder to Wink, Tex. 2-1-54.

Phillips Pipe Line Co.—18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

Service Pipe Line Co.—153 miles, 12-16-in., under way, Tioga-Beaver Lodge area to Mandan, N. D. O. R. Burden Const. Corp. Completion date 12-1-53.

55 miles, 4-6-8-in., under way, Tioga-Beaver Lodge area gathering system. C. P. Bartley & Son.

Sinclair Pipe Line Co.—45 miles, 18-in., under way, Panova to Cushing, Okla. O. R. Burden Const. Corp. Completion date 12-53.

• **Sinclair Pipe Line Co.**—20 miles, 12-16-in., planned, Monee to Blue Island, Ill. Completion date 4-54.

Texas New Mexico Pipe Line Co.—52 miles, 10-in., contracted, Dawson County to Basin System, McVean & Barlow.

Texas Pipe Line Co.—34 miles, 6-in., under way, Sour Lake to Port Arthur, Tex. Houston Contracting.

45 miles, 8-10-in., under way, between Erath and Bayou Sale stations. Houston Contracting Co.

65 miles, 4-6-8-12-in., under way, South Louisiana. Panama-Williams.

Golden Meadow to Houma, La. Panama-Williams.

Gathering lines in Leeville, Bay De Chene and Golden Meadow pools. Panama-Williams.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

Augusta Pipe Line Co.—43 miles, 8-in., under way, from Arkansas City to Augusta, Kans. Ray L. Smith & Son, Inc.

Badger Pipe Line Co.—215 miles, 8-10-12-in., begin Spring '54, East Chicago, Ind., to Madison, Wis. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas Co.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

• **Great Lakes Pipe Line Co.**—Proposed, extension 130 miles, Nebraska City to Grand Island, Neb.

Harbor Products Systems—86 miles, 16-in., under way, Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co. Completion date 1-54.

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn.

Kaneb Pipe Line Co.—246 miles, 8 and 10-

Designed for Today's Portable Drilling Rigs...

It takes rugged, dependable truck winches to move today's portable draw works, power units and masts. You are always sure and safe when your trucks are equipped with BRADEN WINCHES. They are made in capacities from 3,000 to 100,000 pounds.

The easy-to-operate BRADEN OIL-COOLED, FULLY ADJUSTABLE, AUTOMATIC SAFETY BRAKE assures operator of keeping the load always under perfect control.

BRADEN WINCHES are Standard of the Oil Industry.

See Your Dealer or write to factory for information.

BRADEN WINCH COMPANY

P. O. Box 547, Broken Arrow, Oklahoma

BRADEN

in., under way, Wichita, Kans., to Fairmont, Neb. Ray L. Smith & Son, Inc.

Oklahoma-Mississippi River Products Line, Inc.—75 miles, 12-in., under way, West Memphis, Ark., to White River. Williams Bros. 12-31-53.

Under way, White River to Allen, Okla. River Const. Co. Completion date 6-30-54.

Under way, Allen to Duncan, Okla. River Constr. Corp. Completion date 6-30-54.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

Plantation Pipe Line Co.—82 miles, 14-in., under way, Charlotte to Greensboro, N. C. Anderson Bros. 11-10-53.

Salt Lake Pipe Line Co.—40 miles, 6-in., under way, Adams, Ore., to Pasco, Wash. Engineers, Ltd., P. L. Co. Completion date 11-15-53.

Standard Oil Co. (Ind.)—243 miles, 10-12 in., under way, Whiting, Ind. to River Rouge, Mich.

Calumet district, Indiana, Morrison Construction Co.

Lake County, Indiana boundary to Colon, Mich., Somerville Construction Co.

Colon to Romulus, Mich. R. B. Potashnick.

Romulus to River Rouge, Mich. R. L. Coolsaet Construction Co.

205 miles, 10-in., under way, Mandan, N. D. to Moorhead, Minn. Associated Pipe Line Contrs. 12-53.

Sunray Oil Corp.—440 miles, 10-in., contracted, Duncan, Okla., to Mississippi River. Ford, Bacon & Davis. Williams Bros.

• **Triangle Pipe Line Co.**—560 miles, proposed, Arkansas City, Ark., to Covington, Ky., and Nashville, Tenn.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.

Memphis, Tenn., to Louisville, Ky.

Louisville, Ky., to Newark, N. J.

Laterals to Paducah and Lexington, Ky.

Warren Petroleum Co.—34 miles, 4-in., under way, Lea County, New Mexico. Western Const. Completion date 11-53.

• **Williston Basin Pipe Line Co.**—244 miles, 8-in., proposed, Laurel-Billings, Mont., refineries to Glendive, Mont.

Wolverine Pipe Line System—200 miles, 14-in., under way, Chicago-Toledo-Detroit. (Joint ownership of Shell, Texas, and Cities Service.) Anderson Bros. and Midwestern Constructors, Inc. Completion date 1-54.

East Chicago, Ind. to Kalamazoo River, Midwestern Constructors, Inc.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 540 miles, 10-in., contracted, Billings, Mont., to Spokane, Wash. 9-54.

Billings to Bozeman, Mont. Ross and Powers.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co.

Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co.

Natural-Gas Pipe Lines

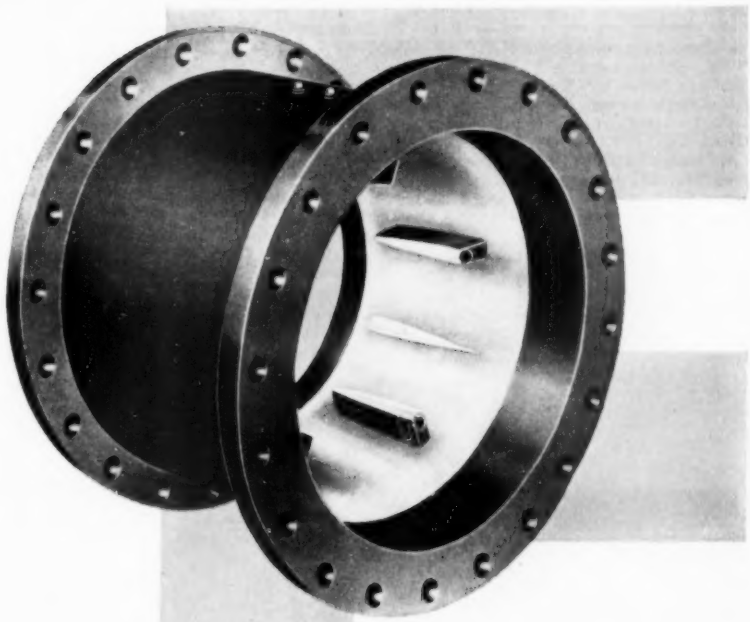
• **America-Louisiana Pipe Line Co.**—1,000 miles, 30-in., proposed, Lowry, La., to Detroit, Mich.

• **Arkansas-Missouri Power Co.** — 140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, proposed, Missouri.

• **Atlantic Seaboard Corp.**—29 miles, 26-

FOR ACCURACY IN METERING



CHOOSE A FLOW TUBE

Flow Tubes are furnished with head capacity curves based on laboratory tests. For unusual piping arrangements, special tests can be run simulating actual conditions. The data furnished with each Flow Tube makes exceptional metering accuracy possible.

Flow Tubes have many other plus values — they're compact, comparatively light weight, and are easy to install since they require minimum straight runs entering and following. And, Flow Tubes are available in types and D/d ratios to provide differentials that can be accurately measured with the least head loss.

That's why Flow Tubes are being successfully used in scores of installations metering the flow of liquids and wet or dry gases. Available in all pipe sizes and suitable metals. They can be furnished with or without suitable secondary indicating, recording or totalizing instruments. For further information, write for your Flow Tube Data File. For specific recommendations, send us necessary flow data.

PRESSURE REGULATORS • RELIEF AND BACK PRESSURE VALVES • CUSHION CHECK VALVES • FAN ENGINE REGULATORS • PUMP GOVERNORS • TEMPERATURE REGULATORS • FLOAT AND LEVER BALANCED VALVES • NON-RETURN VALVES • VACUUM REGULATORS OR BREAKERS • STRAINERS • SIRENS • SAFETY VALVES • FLOW TUBES

FOSTER ENGINEERING COMPANY · UNION, N. J.

in., proposed, looping along Cobb-Rockville, Md., line.

Buzzards Bay Gas Co.—28 miles, 8-in., contracted, Hyannis, Mass., to Bourne Bridge, Mass. Hallen Co., Inc.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.**—70 miles, proposed, Floyd County, Georgia to Dalton, Ga.

• **Chicago District Pipe Line Co.**—31 miles, 24-30-in., proposed, East bank of Des Plaines River southwesterly to near Hodgkins, Ill., on through Cook County to Will County, Illinois.

• **Cities Service Gas Co.**—18 miles, 16-in. Lawrence and Newton counties, Missouri.

69 miles, 20-16-in., planned, Cleveland, McClain, and Garvin counties, Oklahoma.

• **City of Fayette, Ala.**—20 miles, 5-in. proposed, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Ala.

City of Dallas, Ga.—8 and 4½-in., distribution system. Engineering & Const. Co., 1954.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

Colorado Interstate Gas Co.—70 miles, 20-4-in., under way, gas-gathering system in Kansas. Engineering & Const. Co. 1-1-54.

243 miles, 4 to 20-in., under way, Colorado, Oklahoma, Texas, and Kansas. Engineering Const. and Z. J. Graham.

50 miles, 20-in., under way, Hugo to Eads, Colo. R. H. Fulton. Completion date 12-1-53.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

East Tennessee Natural Gas Co.—96 miles, 16-in., under way, Knoxville, Tenn., to Kent line. Engineering & Const. Co. 1-1-54.

54 miles, 4-12-in., under way, laterals off main line from Knoxville, Tenn., to Kent line. Engineering & Const. Co. 1-1-54.

• **El Paso Natural Gas Co.**—1,178 miles, proposed, Permian basin, New Mexico, Texas and Colorado.

El Paso Natural Gas Co.—771 miles, 30-in., under way, Plains, Tex. to Kingman, Ariz.

Section 1—Under way, Plains, Tex., to Corona, N. M. Oklahoma Const. Co.

Section 2—Under way, Corona to Suwanee, N. M. R. H. Fulton.

Section 3—Under way, Suwanee to Gallup, N. M. R. H. Fulton.

Section 4-5—Under way, edge of Navajo Reservation east to Flagstaff on to Kingman, Ariz. Western Pipe Line Const. Inc. Completion date 2-54.

Under way, across Navajo Reservation connecting sections 3, 4, and 5. El Paso Co. crews.

Under way, Spraberry fields, El Paso Co. crews.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Under way, Rayne, La. to Kincade, Tenn. Houston Contr.

Under way, Gordonsburg, Tenn., to Catlettsburg, Ky. H. C. Price Co.

230 miles, gathering lines, under way, Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

Home Gas Co.—46 miles, 12-in., under way, Tioga and Broome counties, New York. H. L. Gentry Const.

22 miles, 12-16-in., under way, Binghampton, N. Y.

Houston Pipe Line Co.—43 miles, 24-in., under way, Edna to Wharton main line. Panama-Williams. 12-15-53.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Ia.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., under way, Washington County to Cedar Rapids, Iowa.

• **Kansas-Nebraska Natural Gas Co.**—41 miles, 10-12-in., proposed, Kansas and Nebraska.

41 miles, proposed, Albion, Arcadia, and Broken Bow, Neb.

Kansas-Nebraska Natural Gas Co.—32 miles, 8-12-in., under way, Devel County, Nebraska, to Logan County, Colorado. M & R Const. Co. Completion date 11-15-53.

18 miles, 16-in., Palco to Hill City, Kans. Completion date 11-15-53.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

when TRANSITE® PIPE is used for Salt Water Disposal

Excessively high replacement costs caused by pipe corrosion disappear when Transite Pressure Pipe is used for salt water disposal. Users everywhere have found Transite Pipe stands up under extremely severe conditions, under the action of salt water on the inside and corrosive soil on the outside.

Transite Pipe's enviable record of long service is traceable to the nature of the product itself. Manufactured by Johns-Manville from asbestos fibres and portland cement, it embodies the toughness and durability of these nonmetallic materials.

Transite Pipe saves in other ways, too. Its high carrying capacity minimizes pumping expense. In addition, its light weight permits ease of handling and assembly. Specially designed Transite Couplings provide flexible yet really tight joints with less installation time.

• • •

Transite Pressure Pipe for salt water disposal is made in a wide range of sizes. For further information write to Johns-Manville, Box 60, New York 16, N. Y.

Johns-Manville
TRANSITE PRESSURE PIPE
AN ASBESTOS-CEMENT PRODUCT

WHAT ASBESTOS PIPE LINE FELT DO YOU NEED?

- NICOLET 15# ASBESTOS PIPE LINE FELT.
- NICOLET 15# PERFORATED ASBESTOS PIPE LINE FELT.
- NICOLET 8# ASBESTOS PIPE LINE FELT.
- NICOLET "VITRABESTOS."

If these standard products do not meet your specifications we will be pleased to work with your engineers to help solve your problem.

The Felt With a Future

MANUFACTURED BY:
NICOLET INDUSTRIES, INC.
70 Pine Street New York 5, N. Y.

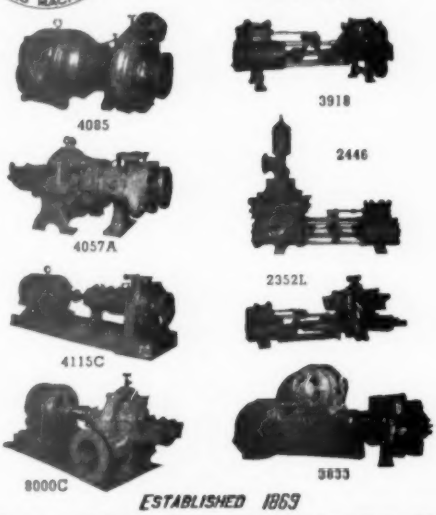
DISTRIBUTED BY:
MIDDLE WEST COATING & SUPPLY
207-A Daniel Bldg. Tulsa, Okla.
P. O. Box 153 Ph. 2-5215 or 2-5216

EASTERN DISTRIBUTOR—Stuart Steel Protection Corp., 2 Mark Road, Kenilworth, N. J.

DEAN BROTHERS PUMPS INC. INDIANAPOLIS IND. DEAN BROTHERS PUMPS INC. INDIANAPOLIS MACHINERY

PUMPS

CENTRIFUGAL
RECIPROCATING
BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W. TENTH ST.

A *NEW* MURPHY SAFETY SWITCH FOR *SURE* FULLY AUTOMATIC ENGINE PROTECTION

model *O-270*

Set lock-out by pushbutton. Engine oil pressure rise releases lock-out and places switch circuit in operation automatically.

Stops Engine AUTOMATICALLY when Oil Pressure Falls . . .

- Visible contacts and pressure gauge on one face
- See it work — you know it's working all the time
- Easy to install
- Simply screw into oil pressure line or on block. Run wire to magneto ground terminal.

GUARANTEED FOR ONE FULL YEAR

Sold by Engine Dealers and Supply Stores

FRANK W. MURPHY *Manufacturer*
BOX 1476 TULSA, OKLA
769 N. VINE ST LOS ANGELES 38, CALIFORNIA

36 miles, 12-in., planned, Stamford to Abilene, Tex.

Lone Star Gas Co.—44 miles, 12-in., under way, Red Springs, Woods County to Sulphur Springs area, Hopkins County, Texas.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

Michigan Consolidated Gas Co.—30 miles, 12-20-24-in., under way, gas gathering system in Six Lakes field. Somerville Const. Co. 11-1-53.

• **Mississippi River Fuel Corp.**—109 miles, 10-18-in., planned, laterals in Woodlawn and Waskom gas fields, Texas.

Missouri Central Gas Co.—25 miles, 6-in. contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada - Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Producer Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

Nevada Natural Gas Pipe Line Co.—114 miles, 10¾-in., under way, Topock, Ariz., to Las Vegas, Nev. R. H. Fulton.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **Northeastern Gas Transmission Co.**—22 miles, 8-in., planned, Upton, Mass., to Pawtucket, R. I.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.**—458 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska, Iowa and Minnesota to connect with Permian Basin System.

475 miles, proposed branch lines to Iowa, Nebraska, Minnesota and South Dakota.

Northern Natural Gas Co.—Section No. 1, 92 miles, 30-in., under way, Dumas via Sunray to main line north of Canadian River, Texas, and two loops near Beaver station, Oklahoma. R. H. Fulton & Co. Completion date 11-53.

Northern Natural Gas Co.—Section 2, 70 miles, 30-in., contracted, loops near Mullinville, Bushton and Clifton stations, Kans., and Palmyra station, Neb. Lone Star Constructors. Completion date 11-53.

Northern Natural Gas Co.—Section 3, 94 miles, 24-in., and 30-in., contracted loops near Paulina, Ogden, and Oakland stations, Iowa. G. G. Griffis Construction Co. Completion date 11-53.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line, planned. Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

129 miles, 31-in, proposed, main-line loops along Topock, Ariz., to Milpitas, Calif. Completion date 11-54.

Pacific Gas & Electric Co.—88 miles, 34-in., under way, portions of 34-in. Topock-Milpitas pipe line. Completion date 4-15-54.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co.—280 miles, 16-24-26-30-in., under way, West Texas and New Mexico. R. H. Fulton & Co.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

South Carolina Gas & Electric Co.—160 miles, 16-12-10-in., contracted, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C. Williams Bros. Completion date 1-54.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

Southern California Gas Co., and Southern Counties Gas Co.—73 miles, 30-in., under way, loops on main line from Blythe to Los Angeles. River Const. Co. 1-54.

Southern Counties Gas Co.—15 miles, 24-in., under way, Brea to Santa Ana, Calif. Hood Const. Co. 11-15-53.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Alabama, and Georgia, and South Carolina. Houston Contracting, Latex and H. C. Price. Fall 1953.

Wrens, Ga., to Savannah, Ga. Houston and Latex of Georgia. Completion date 11-1-53.

Rockmart, Ga., to Rome, Ga. Latex of Georgia. 11-1-53.

Elmore, Ala., to Tallahassee, Ala. Houston Contr. Completion date 12-1-53.

Miscellaneous lines in South Louisiana. Houston and Brown and Root. Completion date 11-15-53.

Gwinville to Pickens. Completion in 1954.

Gwinville, Miss., to Ellerslie, Ga. Completion in 1954.

Thomaston, Ga. Completion date 11-53.

Sanderville, Ga., lateral. Completion date 12-1-53.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

Tennessee Gas Transmission Co.—571 miles, 30-in., planned, Kinder, La., to Portland, Tenn.

67 miles, 30-in., planned, loops in Texas and Louisiana.

63 miles, 26-in., planned, loops in Ohio and Pennsylvania.

58 miles, 20-in., planned, Louisiana Gulf Coast to Station No. 507 near Kinder, La.

100 miles, laterals in Texas.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border Hamburg station near St. Catherines.

Texas-Illinois Natural Gas Pipe Line Co.—65 miles, various, under way, vicinity of Victoria and Houston, Tex. O. R. Burden Const. Co. 11-10-53.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **United Gas Fuel Co., and Central Kentucky Natural Gas Co.**—92 miles proposed, Gulf Interstate system, Boyd County, Ky., to Putnam County, West Virginia.

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

32 miles, 24-in., proposed, near Ripley, W. Va., to Lanham station, Putnam County, W. Va.

60 miles, 30-in., proposed, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Ky.

United Gas Pipe Line Co.—44 miles, 20-in., under way, Lirette field to Harvey, La. Brown & Root.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Co.—54 miles, 4-30-in., planned, Lea County, New Mexico.

25 miles, 3 to 20-in., Garvin County, Oklahoma. Completion date 6-54.

Westcoast Transmission Co., Ltd. — (See foreign natural gas pipe lines).

Foreign Crude-Oil Pipe Lines

• **Arabian American Oil Co.**—18 miles, 22-20-in., planned, Qatif to Ras Tanura No. 3. Completion date 1-55.

Basrah Petroleum Co.—65 miles, 24-in., under way, Zubair to Fao, Iraq. Completion date 10-53.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products.)

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia, Venezuela.)

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

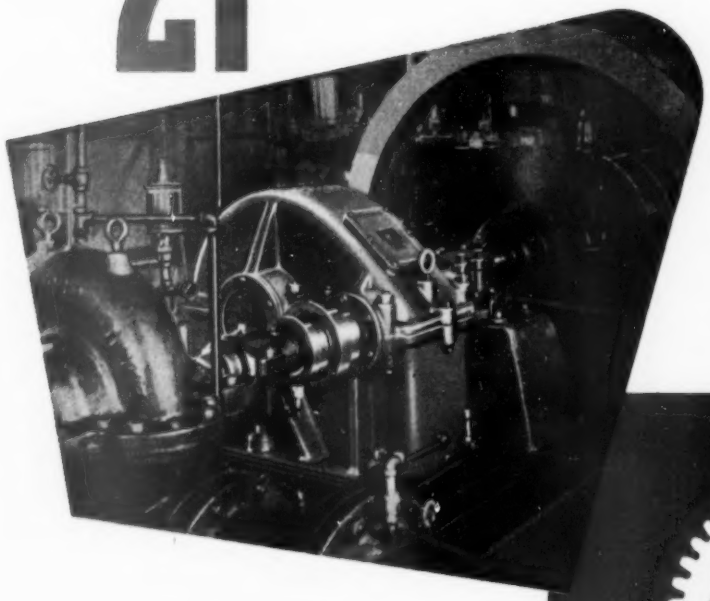
Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—

21 YEARS of CONTINUOUS SERVICE...



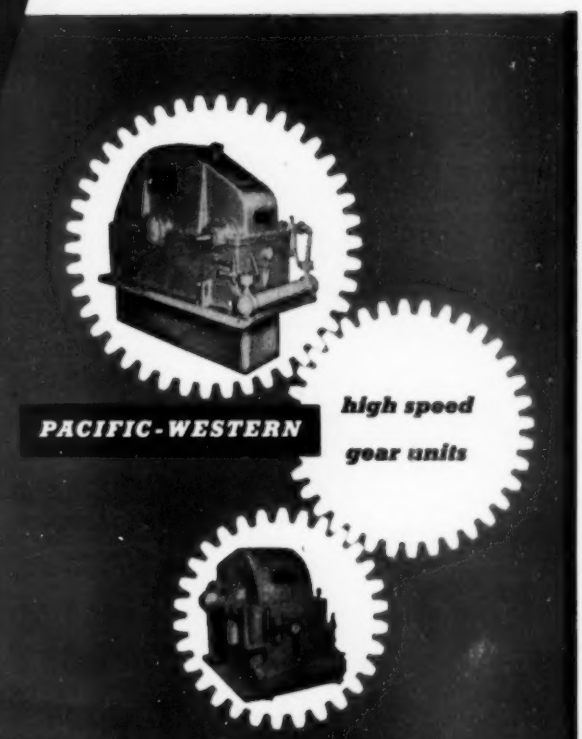
You can Rely on WESTERN GEAR HIGH SPEED GEAR UNITS!

21 years of continued operation, with no record of factory service required for repairs, is the proud claim of a Pacific-Western high speed unit still giving 24-hour duty in a Southern California pumping station.

Specify, with confidence, Pacific-Western high speed units, whenever an increase in speed is required between prime mover and driven equipment. A background of continuous, specialized research and development, plus the accumulated experience gained in 65 years of designing and manufacturing gears and geared products, assures you of the finest equipment available anywhere, for application to your specific requirements.

For complete information, send for our new Bulletin No. 5204 H.S.

Use the coupon below.



Our 65th year

WESTERN GEAR WORKS

Manufacturers of **PACIFIC-WESTERN** Gear Products

Pacific Gear & Tool Works

Plants: Seattle
San Francisco,
Belmont
(S. F. Peninsula)
Lynwood
(Los Angeles County)
Houston

Write, wire or phone your nearest Pacific-Western office

Plants — 417 Ninth Ave. S., Seattle 4, Washington
2600 E. Imperial Highway, Lynwood (Los Angeles County), California
1035 Folsom St., San Francisco 3, California
Belmont (San Francisco Peninsula), California
117 N. Palmer St., Houston 3, Texas

Representatives — N. 2605 Division St., Spokane, Washington
930 S. E. Oak St., Portland 14, Oregon
Room 212, Ross Bldg., Denver 2, Colorado
500 South Ervay Street, Dallas, Texas
Engineering & Machinery Ltd., 1366 W. Broadway, Vancouver, B.C.

WESTERN GEAR WORKS WG-122

Executive Offices, Post Office Box 182, Lynwood, California.

Send free copy of **Bulletin 5204 H.S.** to:

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

WALKER CENTRIFUGE MACHINE

More

COMPACT

The compact, streamlined Walker Centrifuge Machine fits snug into your car—makes gauging simple and handy. It measures accurately the BS and water content of crude oil. Requires minimum maintenance because a direct drive to the tube head eliminates unnecessary bearings which before were subject to dirt. Aluminum casting construction makes it light, rugged, spark resistant. Speed adjustable up to 2450 RPM (required ASTM speed, 1750). Six volts and five and one-half amps make it easy on the car battery.

Everything the Gauger Needs From One Dependable Source

- WALKER OIL THIEF
- GAUGING TAPES
- SAMPLE HEATERS
- STRAPPING KITS
- CARRYING CASES

W. L. Walker Co.

Phone 2-1148

1009 So. Main Tulsa, Oklahoma

30 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Columbian Ministry of Petroleum—115 miles, 4-in., under way, La Dorado to Cartago, Colombia, Williams Bros. Engineers.

93 miles, 8-in., under way, Cantimplora to Dorado, Colombia, William Bros. Constructors.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

Shell Co. of Australia.—34 miles, 8-in., under way, Geelong, Melbourne Ref. to connect with installations at Newport, Australia, Taylor Woodrow. 11-53.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States and Canadian Governments**—600 miles, 8-in., planned, Haines to Fairbanks, Alaska.

Foreign Natural-Gas Pipe Lines

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., under way, Cortemaggiore to Genoa. Completion date 11-53.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., under way, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Mid-Continent Pipelines, Ltd.** — 1,860 miles, 30-in., proposed, Alberta to Montreal, Canada. Fish Engineering Co.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

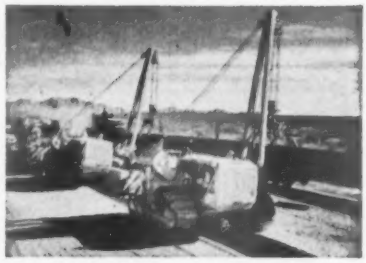
• **Trans-Canada Pipe Lines, Ltd. (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

Not just **CONTRACTORS** *but* **PIPELINE SPECIALISTS**



We have constructed thousands of miles of 30" and smaller lines for major companies throughout U.S.A.

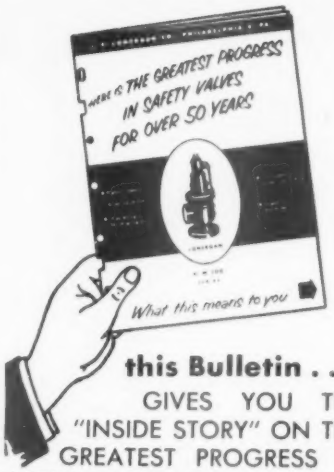
We deliver on schedule.

The best in equipment, finest personnel, and long experience guarantee satisfaction.

ANDERSON BROTHERS CORPORATION

PIPELINE CONTRACTORS

P. O. BOX 2591 • HOUSTON, TEXAS



this Bulletin . . .

GIVES YOU THE "INSIDE STORY" ON THE GREATEST PROGRESS IN SAFETY VALVES FOR OVER 50 YEARS ! ! !

Yes, it's all about the new Lonergan **UNI-LINE** 41-W-200 Series

No other valve like it

Write, today, for your copy of this new UNI-LINE 41-W-200 Series Bulletin.

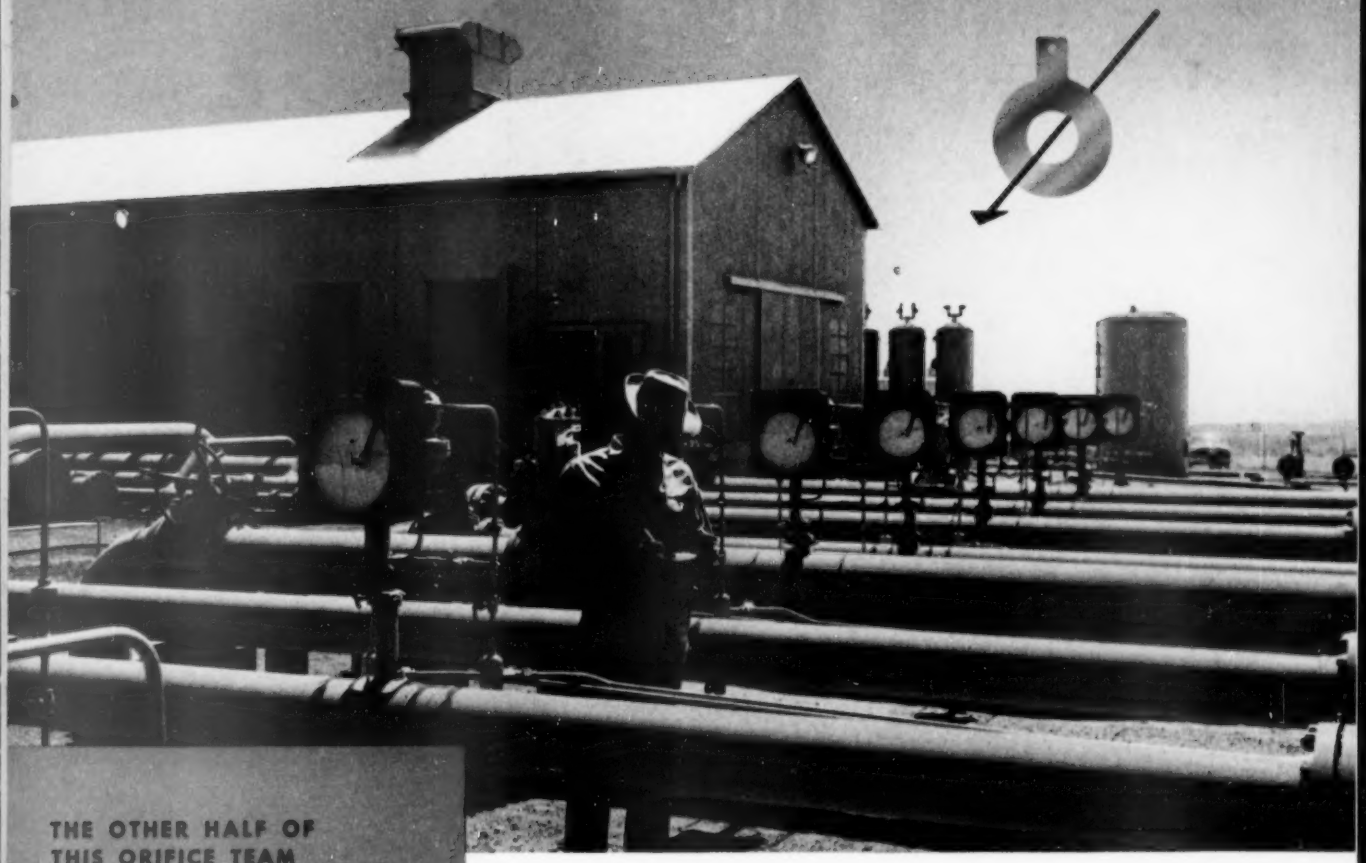
Lonergan

J. E. LONERGAN COMPANY

Second and Race Sts., Phila. 6, Pa.

Over 80 years experience

WHEN GAS IS "PUSHED THROUGH A HOLE"



THE OTHER HALF OF THIS ORIFICE TEAM

THE ROCKWELL INTEGRATOR

By computing your orifice meter charts *mechanically* on a Rockwell Integrator you can be sure that the accurate record made by the gauge will be converted into an accurately totalled extension . . . and with verified results. Accuracy to ½ of 1 per cent is practical. Ask for bulletin 1016.

You Can RELY ON ROCKWELL

ROCKWELL "201" ORIFICE METERS

MEASURE MORE—AT LESS COST!

Dependable large volume measurement is a certainty when you use Rockwell orifice meters. The differential and static mechanism is simple, sensitive, strong—easy to calibrate and may be removed as a unit without disturbing the meter setting. In fact, the whole meter can be dismantled or built up using everyday tools.

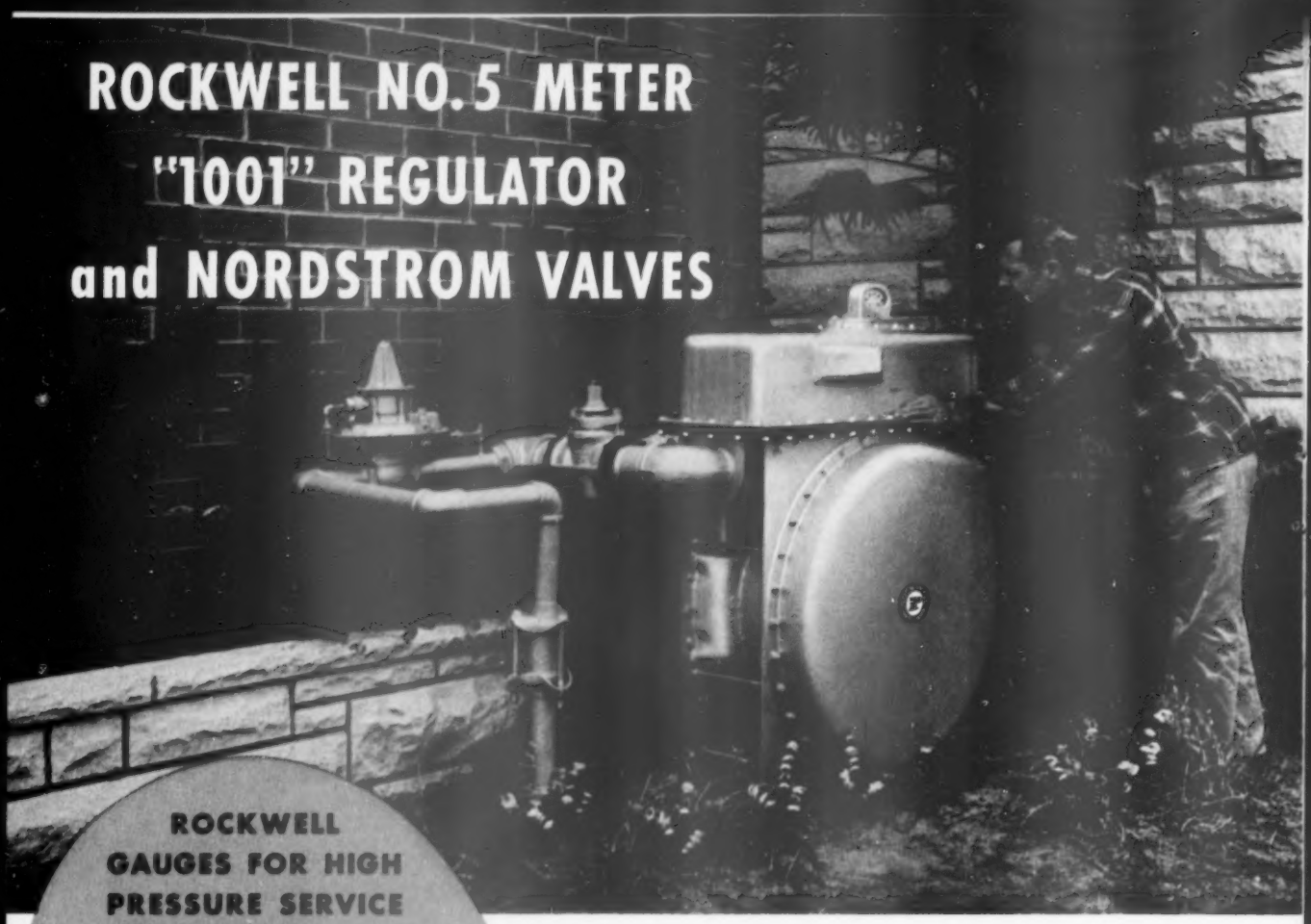
All operating parts in the Rockwell "201" are stainless steel to resist corrosion. The Teflon bearing stuffing box always seals tight, never binds, *needs no maintenance*. And with the Rockwell unit manometer construction you can interchange the high side chamber with other chambers of higher or lower range, thus sparing the expense of stocking complete meters.

To get all these money-saving, money-earning advantages use Rockwell "201" meters on all services. Write for bulletin 1050.

The Rockwell System of

ORIFICE METERING

ROCKWELL NO. 5 METER "1001" REGULATOR and NORDSTROM VALVES



ROCKWELL GAUGES FOR HIGH PRESSURE SERVICE

THE ENCORRECTOR

A recording gauge that gives a direct reading of any metered volume corrected to contract base pressure. It eliminates all calculations.

COMBINED RECORD GAUGE

Furnishes pressure records on charts from which metered volume at any contract base pressure can be calculated. Made in both meter and clock driven types.

A COMBINATION TO BANK ON

When you fabricate your large volume measurement units from Rockwell products, you can be sure of this—measurement will be accurate, regulation constant, valves will turn easily and shut off tight. Further, you will gain the neatest appearing installations; the most compact, the easiest to service. Over the years you will find Rockwell meters and regulators and Nordstrom valves perform faithfully with minimum attention. When required, they are the most economical to repair.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. • Atlanta • Boston • Chicago • Houston • Kansas City

Los Angeles • New York • Pittsburgh • San Francisco • Seattle • Tulsa

There's a ROCKWELL METER and REGULATOR for every use

METERS

TYPE | ALUMINUM | CAST IRON | PRESSED STEEL

REGULATORS

INDUSTRIAL | SERVICE | "1001" | BALANCED VALVE

DIGEST OF NEW EQUIPMENT

IT'S NEW — CHECK IT

TRADE LITERATURE

1 HEAVY-DUTY CENTER-LINE MOUNT PUMPS. Bulletin B-1605 describes the Peerless line of packing-gland and mechanical shaft-seal-construction pumps for handling hydrocarbons, chemical solutions, and water at elevated temperatures and pressures. These pumps are well suited for continuous transfer of crude charge stocks at high temperatures. *Peerless Pump Division, Food Machinery & Chemical Corp.*

2 PARCO O-RINGS, a new, eight-page catalog, contains engineering data on O-rings that provide leakproof performance under severe service conditions, at both high and low pressures and through millions of cycles. These rings are noted for toughness and the ability to withstand abuse. *Plastic & Rubber Products Co.*

3 TINY MASTER CATHEADS. A new data sheet presents price and engineering specifications on new, small-size catheads for service rigs and core drillers. The Tiny Master is manufactured in both a spinning and a breakout cathead design. *Foster Cathead Co.*

4 YOUNG HEAT-TRANSFER PRODUCTS, a new four-page, two-color catalog No. 353, featuring products for chemical, industrial, and oilfield applications, includes: engine-jacket water coolers; "CC" combination cooling units; supercharger air intercoolers; evaporative coolers and condensers; "HC" and "VAD" coolers and condensers. Other units described are: shell-and-tube heat exchangers; heating and cooling coils; unit oil coolers and steam condensers. *Young Radiator Co.*

5 NEW MICRO-KLEAN BULLETIN. The products described include standard models for flows between 1.8 and 900 g.p.m. Maximum operating pressures of standard units range from 125 to 1,000 psi. Featured in the bulletin is the graded density cartridge. Applications, standard dimensions, case histories, and a selector chart are included. *Cuno Engineering Corp.*

6 NEW CONDENSED CATALOG NO. 531 describes the Quick-As-Wink line of air and hydraulic control valves, and valve couplings. It shows sectional views of body, plunger, packing and interior operation and lists sizes, actions, permissible pressures, and temperatures. *C. B. Hunt & Son, Inc.*

7 WADE QUICK-LOK COUPLERS. New and larger couplers and fittings added to the line of aluminum couplers for portable industrial pipe lines are described in a comprehensive new folder featuring performance on the job. Designed as a lightweight, quickly attached coupler, particularly adapted to field use of portable pipe lines, "Quick-Lok" couplers are used in the oil industry, and wherever air, liquids, fuel, or chemicals must be handled. *Wade Manufacturing Co.*

8 TELSTOR CONTINUOUS LEVEL INDICATOR is illustrated and described in a graphic eight-page bulletin. Instrument features simplified circuitry, accuracy to ± 2 per cent, and continuous indication at remote or local stations. *Robertshaw-Fulton Controls Co.*

9 CORROSION RESISTANT PIPE, TUBING AND FITTINGS. The profusely illustrated 24-page catalog covers the complete line of SWEPCO large-diameter, corrosion-resistant pipe,

FOR MORE INFORMATION . . . . use one of these cards

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
(21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40)
(41) (42) (43) (44) (45) (46) (47) (48) (49) (50)

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Nov. 2, 1953

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... ZONE NO. ..... STATE .....
NAME ..... TITLE .....

tubing, and welding fittings. Sections on special metals and alloys, grades and finishes, size and length tables, weight tables, standard tolerances, and dimensional charts are included. Results of recent tests on welded pipe are also given. *Stainless Welded Products, Inc.*

10 VALVE SPECIFICATIONS New four-page bulletin SP-CV1 presents the latest and most complete specifications for diaphragm control valves. Prepared for users of diaphragm valves, it is of particular interest to the large user. *Delaware Valley Engineering Co.*

11 TAPER-LOCK STOCK ROLLER-CHAIN SPROCKETS. A new 16-page, pocket-size catalog (B55-53) lists prices and specifications. Tables in the catalog list: horsepower ratings, taper-lock bushing, and sprocket specifications, and prices, and roller chain and part specifications and prices for ½, ⅝, ¾, 1, and 1¼-in. pitch chain. Installation and removal procedures for taper-lock sprockets are listed in the catalog as well as horsepower selection charts, drive selection procedures, and service factor tables. *Morse Chain Co.*

12 YALE PUL-LIFT. The Pul-Lift, chain-hoist design which either hoists or pulls, is illustrated and described in Bulletins P-260B and P-1260. Developed to meet the demand for a general purpose tool, the Pul-Lift operates in close quarters by means of short strokes on a ratchet handle and is ideal for riggers' equipment. It is available in ¾ to 15-ton capacities. *The Yale & Towne Manufacturing Co.*

13 A WIRETEX RUBBER-COVERED HYDRAULIC-HOSE SELECTOR. Starting with any known factor, such as the i.d., o.d., minimum burst, working pressure required or bend radius, a designer or maintenance man can use the selector to determine the proper rubber-covered hydraulic-control hose for the operation on which the hose will be used. *Republic Rubber Division, Lee Rubber & Tire Corp.*

14 SOLIDS CONTACT REACTOR is a comprehensive new 24-page bulletin on equipment for clarifying and/or lime softening of water. This catalog defines major advantages of the Solids Contact principle, gives eight basic requirements for sound Solids Contact Reactor design and shows how these features are incorporated by Cochrane. It illustrates the basic reactor types that can be supplied. Chemical feed and auxiliary equipment are also described. *Cochrane Corp.*

15 TEMPERATURE RATINGS OF PIPE. A new technical bulletin TB1-1953 contains more than 5,000 pressure-temperature ratings of the various grades of pipe in common use in power plants. These ratings have been calculated by the recently revised formula and allowable stress values applying to the A.S.A. Code for pressure piping and the A.S.M.E. power boiler code. Ratings are arranged for easy reference and will eliminate laborious calculations previously necessary. *The Pipe Fabrication Institute.*

16 L.&N. OXYGEN RECORDING EQUIPMENT DELIVERS NEW PERFORMANCE. There are sections on how the paramagnetic principle works, how L.&N. applies this principle, and how the resulting signal is handled by the Speedomax recorder. Proper sampling is not overlooked. Other sections dealing with applications, performance, and specifications, round out the contents of this handy booklet. *Leeds & Northrup Co.*

17 CATERPILLAR DIESEL D8 TRACTOR. Innovations on this largest of Caterpillar track-type tractors including increased steering ease, high-capacity steering clutches, and a new triple-plate oil-type flywheel clutch are illustrated through drawings and cutaways. Also included is a large cutaway of the complete Caterpillar D8 tractor showing its advantages. A detailed specification sheet completes the booklet. *Caterpillar Tractor Co.*

18 VERTICAL SCALE INDICATOR. Bulletin 1541 illustrates and describes 6½-in.-wide instrument for the rapid and precise multiple indication of any variable that can be transformed to millivolts. Designed for applications where panel space is at a premium. *Minneapolis-Honeywell Regulator Co.*

FOR MORE INFORMATION . . . . use one of these cards.

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
(21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40)
(41) (42) (43) (44) (45) (46) (47) (48) (49) (50)

For further information—without obligation—I have checked numbered circles above

Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Nov. 2, 1953

PLEASE PRINT
COMPANY NAME .....
STREET ADDRESS .....
CITY ..... **ZONE NO.** ..... **STATE** .....
NAME ..... **TITLE** .....

Postage Will Be Paid by Addressee

No Postage Stamp Necessary if Mailed in United States

BUSINESS REPLY CARD
Permit No. 3A, 34.9 P. L. & R., Tulsa, Oklahoma

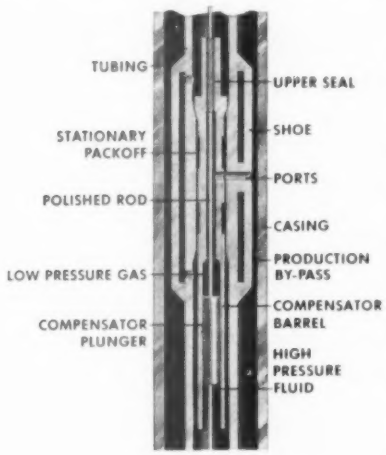
THE OIL AND GAS JOURNAL
BOX 1260
TULSA, OKLAHOMA

DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

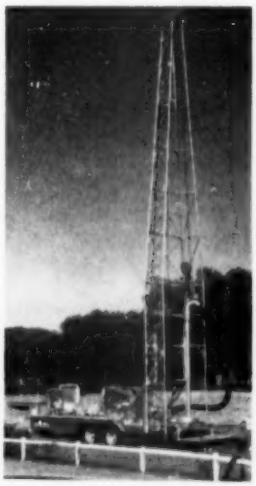
by Dan B. Miller

19 THE OILMASTER ROD WEIGHT COMPENSATOR hydraulically balances lower half of tool string. This compensator is actually a hydraulic counterbalance located somewhat below the midpoint of the rod string. It solves the problem of high sucker-rod stresses in very deep wells by balancing out part of the sucker-rod weight at a point midway in the rod string. By counterbalancing the weight of the lower part of the rod string, the compensator substantially reduces the stress in all of the sucker rods located above it. The lifting force is applied to the rod string by the compensator piston. The high pressure of the fluid in the tubing acts on the bottom of this piston. The low-pressure gas from the casing acts on the top of this piston. This difference in pressure across the piston causes a lifting force which substantially reduces the weight on the upper part of the rod string. Since sucker-rod strings should always be operated in tension, the compensator should be located at a point in the well where there is a sufficient weight of rods below it to cause it to drop. For this reason, each compensator installation should be individually designed. In an optimum installation the buoyant weight of rods located below the compensator will just exceed the compensator lift, so the rod string will remain in tension on the down stroke. A well may be produced from 30 per cent greater depth without increase in rod stress. Lowered rod load permits a higher fluid load increase in rod stress. The compensator reduces effective dead weight of rods by 33 per cent which greatly lengthens rod life. *Fluid Packed Pump Co.*



IT'S NEW ✓ CHECK IT

20 HOLEMASTER JED can be used either for conventional type rotary drilling or reverse circulation drilling. The change from one type to another is accomplished quickly and with very little effort. The JED is designed to drill large-diameter holes to 500-ft. depths by the reverse-circulation method, with 6-in. inside-diameter drill pipe. Using the same pump unit (centrifugal type) it will drill 1,000-ft. holes with 4½-in. conventional drill pipe. The unit will handle a maximum casing load of 56,000 lb. and the retracting rotary table permits a clearance for 60-in. casing or bits. Only a few optional items of equipment are necessary to change quickly from reverse circulation to regular rotary drilling. One of the outstanding features of the JED rig is the jet eductor. This is a hydraulic jet mechanism, so designed that it develops an exceptionally high vacuum, thus enabling operations to a greater depth. The jet eductor is instantly self-priming. The 6-in. full opening through the jet, which has no moving parts, is designed so that all the cuttings, grit, and boulders in the return line completely bypass all mechanical devices. The centrifugal pump handles the small quantity of cutting-free water necessary to actuate the jet. The kelly which is used for reverse circulation operations is 7-in. outside diameter, 6-in. inside diameter, and 14 ft. long. *George E. Failing Co.*



IT'S NEW ✓ CHECK IT

21 SEDIMENT SEPARATOR FOR HYDRAULIC PUMPING POWER OIL. In commercial use, the separator has reduced the b.s. and w. and sediment content of power oil for hydraulic pump systems to such a low percentage that engine end efficiency has been substantially increased. On one lease, where sediment in the power oil had necessitated pump pulling and repairs every 4 or 5 months, the production engineers estimate that pumps will

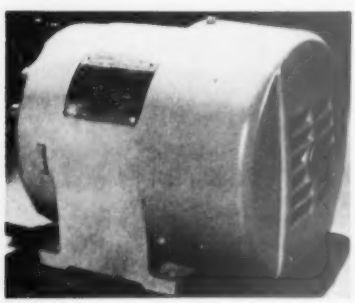
KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

now have to be pulled only once in 3 years, and then primarily to insure against freezing in the well. The sediment separator processes the crude (to be used as power oil) after it has been dehydrated by one of the conventional commercial demulsifying processes. The powerful electric field in the separator precipitates the residual moisture and solids, the clean power oil passing on into the hydraulic pumping system. In one typical installation, the removal percentage of b.s. and w. was 96 per cent and the solid materials were reduced 75 per cent. *Petreco Division of Petrolite Corp.*

IT'S NEW CHECK IT

22 TRI-CLAD "55." These new motors built to latest standard N.E.M.A. frame dimensions, and they feature entirely new and advanced concepts of motor design.



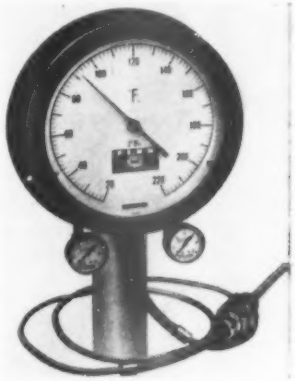
With an average size reduction of 50 per cent by volume and averaging 22 per cent less weight per horsepower, the "55" retains rigid cast-iron construction and incorporates a new insulation system, bearing assembly, and ventilation plan. The keystone of the insulation system is a new polyester film which is eight times as strong as previously used materials. It is used to insulate the phases and slot tubes in the stator. This synthetic material, combined with Formex wire, an improved Glyptal varnish, and a silicon Dri-film dip, has withstood accelerated life tests and salt-spray tests better than any system tried. The new bearing assembly is more tightly sealed and is lubricated by a grease which lasts at least five times longer than formerly used lubricants. Larger integrally cast rotor fans increase the cooling air flow through the motor. According to the engineers, the noise level of the new 10-hp. motor tests as low as the former 2-hp. model. These new motors will be available in the 182 and 184 frame sizes (1, 1½, and 2 hp. at 1,800 r.p.m.) in horizontal dripproof and totally enclosed fan-cooled models, and a complete line of gear motors. *General Electric Co.*

IT'S NEW CHECK IT

23 NEW CONTROLLED VOLUME PUMPS FOR SUBMERGED OPERATION. Designed especially for handling dangerous fluids, the entire liquid-end assembly is submerged in a sump with only the driver and discharge piping exposed. With the pumping cylinder submerged, problems of stuffing-box leakage are eliminated. Basically, the pump is a variation of the "miniPump" and will operate in approximately the same range: capacities up to 3,200 ml. per hour; pressures up to 1,000 psi. *Milton Roy Co.*

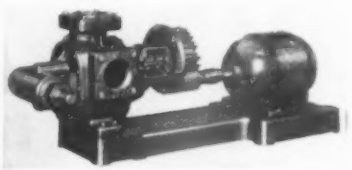
IT'S NEW CHECK IT

24 INDICATING TEMPERATURE PNEUMATIC TRANSMITTER. A high-grade dial thermometer has been combined with the proved, rugged pneumatic transmitter. The combined unit, suitable for outdoor unprotected installation, may be mounted on 2-in. pipe, wall bracket, or panel. The dial thermometer utilizes a mercury-filled thermal system for temperature ranges from —40° to 1,000° F. and provides an evenly graduated 8-in. diameter scale. A wide variety of bulbs and sockets can be furnished. Standard air output range of pneumatic transmitter is 3 to 15 psig. The instrument is particularly convenient since it combines in one compact assembly, both the transmitting and indicating functions; thus eliminating the need for long lengths of capillary tubing or additional indicators. Any number of receivers can be operated by a single transmitter which makes it possible to indicate, record, or control temperatures simultaneously at several different locations in a plant. *Penn Industrial Instrument Corp.*



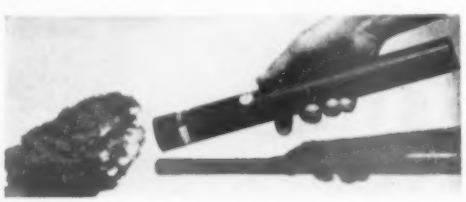
IT'S NEW CHECK IT

25 3600 SERIES MAHBRV 5 and 6 MOTOR-DRIVEN PUMPS have a range of capacities from 70 to 226 g.p.m. at 60 psi. Each size has three interchangeable gear ratios. These pumps, designed for petroleum, process, and general industries, have unusual adaptability to many pump jobs. Features include: totally enclosed gear reduction running in oil; antifriction bearings throughout gear reduction; outdoor or indoor operation; and rigid mounting of both pump and motor on a sturdy bedplate. The gear reduction is mounted on the rigid backplate assembly of the pump and is adjustable to receive many different types of motors. The standard pump head has two equal-size hardened alloy pumping gears operating in axial hydraulic balance. They are keyed to the shaft with a sliding fit making inspection and replacement of pumping gears easy by removal of the face plate. *Geo. D. Roper Corp.*



IT'S NEW CHECK IT

26 BLACKLIGHT WAND. Field tests indicate the new wand will broaden use of ultraviolet detection and comparison in a wide range of scientific and commercial



What's NEW

In Perforating, Logging, and Fishing Tool Services

McCULLOUGH
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

Recover All Free Pipe in

Two Easy Operations

Know exactly where the pipe is stuck — Free it faster with the world's fastest Back-Off Service

McCullough Magna-Tector and String Shot

All free pipe is recovered in two easy operations by the world's fastest back-off service. The McCullough Magna-Tector locates the stuck point with extreme accuracy in a matter of minutes. The String Shot loosens the first joint above the stuck point. The free pipe is backed off and removed from the well. Drill collars or pipe remaining in the hole are usually recovered by wash over and fishing operations. Selected joints in the remaining stuck pipe may be loosened in advance so that sections of the fish can be recovered, progressively deeper as they are washed over.

These two tools not only quickly and easily recover all free pipe and pave the way for the economical recovery of the stuck portion; they also successfully perform the unusual, tough jobs that are otherwise so costly and time consuming.

More than 8,000 jobs have been successfully completed by the McCullough Magna-Tector and String Shot—jobs that have saved thousands of dollars and hundreds of hours of rig time.

TYPICAL JOB ACCOMPLISHMENTS

1. Stuck drill pipe job on a deep well. The Magna-Tector found free point at 7472 feet. Ran String Shot and backed off at that point. Remaining 9400 feet of $4\frac{1}{2}$" drill pipe was recovered by wash over operations and the use of the Magna-Tector and String Shot. Twenty String Shots were run and completed without a single miss.

2. The McCullough Magna-Tector located the stuck point in 7" O.D. drill collars at 8100 feet. The String Shot loosened the first joint above the stuck point. All free pipe was recovered successfully even though operations were conducted in a dog leg in a 56° slant hole.

3. The McCullough Magna-Tector was run through $2\frac{7}{8}$" tubing, through the 2" I.D. of a spear and located the stuck point in $6\frac{3}{4}$" liner at 5185 feet. All free pipe and the stuck portion of the liner, were recovered in a few simple, economical operations.

4. Three hours and 55 minutes of rig time was all it took to locate the stuck point at 10,600 feet and back-off $3\frac{1}{2}$" drill pipe with McCullough Magna-Tector and String Shot.

5. The Magna-Tector revealed that the packer was stuck in 7" casing. A fifteen foot String Shot, 200 grains of explosive per foot, was placed through the body of the packer and detonated. Packer came loose immediately. There was no damage to either tubing or the packer.

THOUSANDS OF DOLLARS AND HUNDREDS
OF HOURS OF RIG TIME HAVE BEEN SAVED BY THE
McCULLOUGH MAGNA-TECTOR AND STRING SHOT

...Call your McCullough Service Engineer for full information, or write for technical bulletin #401—IT CAN SAVE YOU MONEY.

PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE—ANYWHERE—ANYTIME.

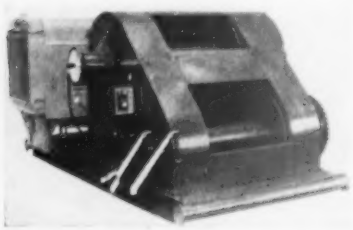
McCULLOUGH TOOL COMPANY
5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P. O. Box 2575) • Houston, Texas
CABLE ADDRESS: MACTOOL
EXPORT OFFICE: Los Angeles, California
CANADA: Edmonton, Calgary, Grande Prairie, Alb.; Regina, Saskatchewan
VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls, Luling, Beaumont, Sherman, Midkiff, El Campo. **OKLAHOMA:** Oklahoma City, Guymon, Healdton, Hominy, Wewoka. **ARKANSAS:** Magnolia. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.

activities. Miniaturization of the electronic components has enabled reduction of total weight including two standard flashlight batteries, to only 1¾ lb. Factors of ready portability and independence of normal power outlets make the Blacklight Wand particularly useful in field work such as prospecting, petroleum geology, and materials testing. Ultraviolet generator contained in the 1⅝-in. diameter brass tube housing is an instant-starting, low-pressure, mercury vapor discharge tube of the cold-cathode type. Thin metal guard strips shield the special hooded ultraviolet filter without impeding its ultraviolet output. *Menlo Research Laboratory.*

IT'S NEW CHECK IT

27 **IDEAL T-8-S** is a small, portable double-drum hoist. Its adaptability to truck and trailer mounting is one of the features of this compact rig. The draw-works width, including engine drive units, can be reduced to 8 ft. by removing the catheads. This feature increases rig mobility, permits rapid movement to new job sites, and cuts rigging-up time. The new Ideal Type T-8-S is basically a double-drum rig having a higher catshaft than the single-drum T-8, which was introduced last year. It is offered with or without sand reel. Both are of 80 input horsepower and incorporate many features of larger Ideal rigs. Both were designed primarily for well-servicing work in the 2,000 to 4,000-ft. depth range and for drilling in the 1,000 to 2,000-ft. range. The sand reel drum is free running on roller bearings mounted on the catshaft. The same actuating control for the main-drum air clutch is also used for sand-reel operation. This dual-purpose control arrangement is accomplished by means of a four-way hand-operated air valve positioned below the control panel. The sand reel is driven through a Fawick Airflex clutch. Equalizing type, one-point adjusting brakes with block-type linings are operated by hand lever. Brake-rim cooling is provided by a water-spray system. Drip lubrication of catshaft to main drum chain is manually regulated by the dual sight feed valves located on the driller's side of the rig. *The National Supply Co.*



IT'S NEW CHECK IT

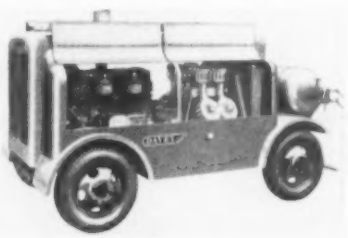
28 **NEW ASPHALT AND FELT PLANK DITCH AND RESERVOIR LINING.** These planks, known as Spring-Kote No. 96T, provide a quick, economical means of waterproofing ditches, ponds, and industrial waterways and reservoirs. Because of their density, these liners also provide good weed control and eliminate periodic attention. They have been used with outstanding success as a protection against water wash. These ditch and reservoir liners are low in cost and doubly economical in that they are quickly and easily laid with minimum work involved in preparing the ground and because they require no earth or gravel cover. They are very flexible and easily conform to irregularities in the earth. Four men can install up to 12,000 sq. ft. of lining per day. Their durability is proved by installations in which they have been repeatedly subjected to cattle traffic without sustaining any damage. *Spring Packing Corp.*

IT'S NEW CHECK IT

29 **NEW 15-CF ATMOSPHERIC CONTROL.** The 15-CF has been designed and built for any type of moisture-vapor testing within the limits of minus 20° F. to plus 200° F. with a relative humidity of 18 per cent to slightly under 100 per cent. This type of cabinet is used primarily for testing all types of greases, plastics, chemical, and metallurgical samples, or any materials which may be effected by temperature and/or humidity. This equipment may be ordered equipped with conventional or electrode controls. *Package Materials Laboratories, Inc.*

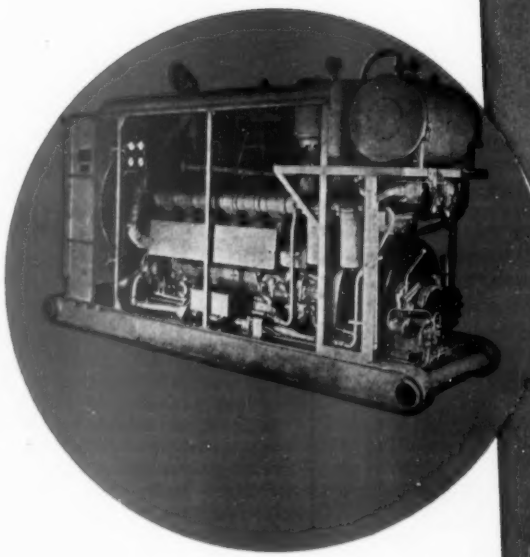
IT'S NEW CHECK IT

30 **DAVEY SUPER CHIEF 600** is available in both skid and four-wheel trailer-mounting styles. It is the largest capacity unit produced by Davey. The new unit has four low-pressure cylinders with 8-in. bore and 4-in. stroke, and two high-pressure cylinders with 6⅝-in. bore and 4-in. stroke. Standard features include automatic compressor engine controls; individually finned, separately replaceable cylinders; full force-feed lubrication; cast-aluminum crankcases; multiport valves; automotive-type steering; full spring suspension and double, built-in, full-length tool boxes. The four-wheel trailer is 150 in. long, 75 in. wide and 95 in. high. Net weight is 9,300 lb. Skid dimensions are 150 by 63 by 69 in. Skid weight is 8,700 lb. *Davey Compressor Co.*



IT'S NEW CHECK IT

31 **COMMERCIALLY PURE TITANIUM,** precision rolled to very close tolerances and to thin gage and foil, for use in the manufacture of equipment for the oil, gas, and petroleum processing industries, is now readily available. Titanium, an extremely strong, yet lightweight metal, can be compared favorably in strength to many steels, but weighs only 56 per cent as much. The metal possesses excellent corrosion resistance and the ability to withstand high temperatures. Titanium is rolled in strip up to 8 in. wide and down to .0005 in. thick, to tolerances as close as ± .0001 in. The strip is available in any quantity from 1 lb. to thousands of pounds. Typical uses for titanium strip in the petroleum-processing industries include: mufflers, valves, instrument parts; pump parts; heat exchangers; condensers; fastenings and fittings; metering equipment; and trim. *American Silver Co.*



Paxman diesel engines for oil well drilling are mounted on sturdy skid type bases to facilitate handling on and off vehicles for transportation from site to site. They are of compact design and built to keep going under the most arduous conditions. Power and reliability are common throughout the Paxman range of engines which are rated from 100-665 b.h.p.

PAXMAN

diesel engines for oil well drilling

OIL WELL PACKAGE SETS

DAVEY, PAXMAN & CO. LTD., COLCHESTER, ENGLAND

Associated with Ruston & Hornsby Ltd., Lincoln, England

THREE OIL WELL VETERANS

COLMONOY HARD-FACING Keeps Pumps in Service

1

This plunger pumped salt water for twenty-two months straight, 5½ times as long as did unprotected plungers, which lasted only three to four months.

2

Plunger from a pump in acid service. Worked 24 hours a day for over twelve months, more than 4 times as long as previous plunger (not hard-faced).

3

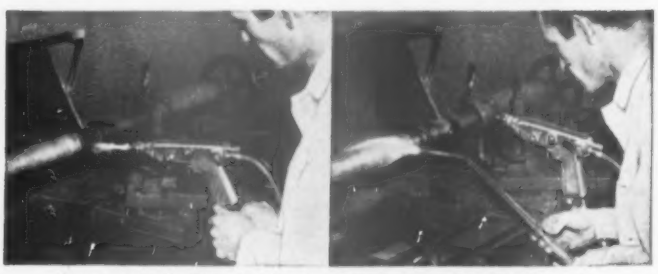
This 1½-inch diameter gasoline pump rod worked constantly for twenty-four months, 8 times as long as it did before being hard-faced. Packing maintenance almost entirely eliminated with Sprayweld surface.

Spraywelded hard-facing makes pump parts last up to eight times longer

In the COLMONOY Sprayweld Process, COLMONOY No. 6 hard-facing is sprayed and welded on pump parts of all kinds. This hard-facing alloy has excellent resistance to corrosion and abrasion and its low coefficient of friction prolongs packing life.

Read the brief case histories of these veteran pump parts . . . they tell the results of hard-facing with the COLMONOY Spraywelder. Ask us for the name of the nearest shop equipped to do Sprayweld work.

For the complete facts on COLMONOY alloys write for the Sprayweld Catalog and Hard-Facing Manual No. 77.



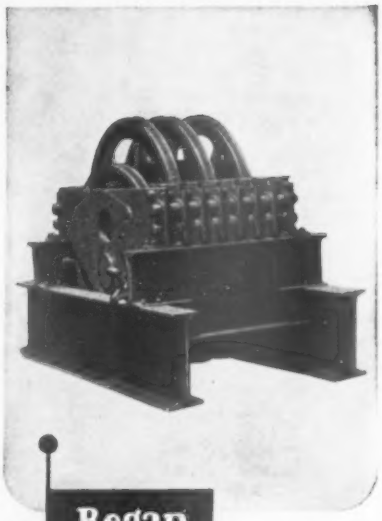
First . . . spray the Colmonoy alloy on. Second . . . fuse it to the base metal.

HARD-FACING ALLOYS

19345 JOHN R STREET **WALL COLMONOY** DETROIT 3, MICHIGAN
CORPORATION

BRANCHES: BIRMINGHAM • BUFFALO • CHICAGO • HOUSTON NEW YORK • LOS ANGELES • PITTSBURGH • MONTREAL

STANDARD
OF THE PETROLEUM INDUSTRY
Since 1905



Regan *type* **AN55**

CROWN BLOCK

. . . built to stand up under the line speeds and loads applied by the largest drilling rigs. Ball bearings have been used to carry the thrust loads and further reduce the side drag on the sheaves. Heavy roller bearings carry the radial loads. The basic Regan design of a rotating inner race ring has been kept but the inner race ring of the roller bearings is mounted on the sheave hub. A bolt through the sheave hub pre-loads the ball thrust bearings and removes all side play from the sheaves. Positive lubrication to each bearing. Capacity—600 tons. *Write for informative bulletin.*

53

Regan

Forge & Engineering Co.

SAN PEDRO, CALIF.
FORT WORTH, TEXAS
Exclusive Mid-Continent and Export Distributor:
MID-CONTINENT SUPPLY CO.
General Offices: **Fort Worth, Texas**

Quality - Wrought on the Forge of Experience

PIPE LINE

Completion Near

Lakehead pumping crude through 635-mile line

SUPERIOR, Wis. — Lakehead Pipe Line Co. is pumping crude through its near-completed 635-mile, 30-in. line which extends from here through Michigan to Sarnia, Ont.

Only a few gaps need to be welded in the $76,000,000 line, which is expected to be ready for full operation within 4 weeks. Construction began last spring.

The project is an extension of Interprovincial Pipe Line Co.'s 1,130-mile crude-oil carrier from Edmonton, Alta., to Superior. Interprovincial is Lakehead's parent organization.

Capacity . . . Upon completion the line will have upwards to 120,000 bbl. per day of Alberta crude pumped through it by a single station at Superior. Addition of five more pump stations along the new system would raise the capacity to 300,000 bbl. daily. Approximately 2,800,000 bbl. will be required to fill the line *(The Oil and Gas Journal, August 3, page 34)*.

Major portion of the project was pulling two 20-in. lines across the Straits of Mackinac. The 21,000-ft. crossing was the world's deepest. The combined Lakehead and Interprovincial lines will constitute the world's longest crude-oil main line *(The Oil and Gas Journal, August 24, page 171)*.

All told, eight pipe-line construction firms have been working on the Lakehead line with Bechtel Corp., San Francisco, coordinating the operation *(The Oil and Gas Journal, April 13, page 161)*.

Northern Natural Plans Gas Lines in Four Midwest States

WASHINGTON. — Northern Natural Gas Co. plans to construct numerous natural-gas branch lines in Iowa, Nebraska, South Dakota, and Minnesota next year in order to supply 49 communities in those states with gas.

The plans were revealed at a recent Federal Power Commission hearing here on Northern Natural's proposed 1954 pipe-line construction program designed to transport 300,000,000 cu. ft. of gas daily from West Texas and New Mexico fields to the Midwest. In this connection, the FPC was told that the large expenditure required for mainline facilities would limit the company's capital allocation for branch lines to $7,000,000 next year. Part of the costs will be borne by utility companies in the areas which will be serviced by the branch lines.

Also, Harry Siert, treasurer of the company, pointed out that the firm may do other financing on various pipe-line projects. He mentioned a proposed gas line from the Canadian border to Minneapolis and St. Paul, Minn., and possibly another line connecting Northern Natural's system with the Williston basin in North Dakota. In addition, he said the firm may have to construct new underground-storage facilities or a line from the Denver-Julesburg basin in southern Nebraska and western Colorado to existing lines in that area.

Williston to Lay 250-Mile Products Line in Montana

BILLINGS, Mont.—Williston Basin Pipe Line, Inc., is negotiating with contractors for construction of a 250-mile, 8-in. products line between here and Glendive, Mont.

The line will serve eastern Montana and western North and South Dakota with products from the Farmers Union Central Exchange, Carter Oil Co., and Continental Oil Co. refineries in the Billings-Laurel area. The company expects the line to be completed and in operation next spring.

Financing of the $7,000,000 line will be handled by Dillon, Reed & Co., New York investment bankers. In addition, Williston Basin has received a certificate of necessity for the project.

Standard Opens 207-Mile Products Line to Mandan

MANDAN, N. D.—Standard Oil Co. (Ind.) is making deliveries through a newly completed 207-mile, 10-in. products line from Moorehead, Minn., to the company's new refinery site here.

Associated Pipe Line Contractors, Inc., of Houston, completed the project approximately 5 weeks before the expected completion date. The line receives products from Whiting, Ind., which are stored in three 96,000-bbl. tanks at Standard's new 30,000-bbl. refinery now under construction at Mandan. When the refinery is completed next fall the flow will be reversed.

The refinery will receive its crude through a 154-mile, 12 and 16-in. line now being laid from Tioga, N. D.,

CLEANER PIPELINES CO.
1900 Armour Road
North Kansas City, Missouri

INTERNAL PIPELINE CLEANERS
EXPANSIBLE RUBBER CORE
For Gas Transmission Lines
6" Through 30"

SPRING LOADED CLEANERS
Individual Coil Springs
Under Each Brush
For Oil, Gas and Products Lines
10" Through 30"

NIGHT CAPS — SQUEEGEES

Pipeline Tools
and other accessories

WRITE FOR CATALOG

For easy handling of thin-walled pipe...
CROSE PIPE CRADLES

Especially designed to handle today's large diameter thin-walled pipe. Large free rolling center roller prevents deformation of pipe. Roller bearing equipped for easy rolling action under loads.

Crose
MANUFACTURING COMPANY, INC.
2715 DAWSON ROAD • TULSA, OKLAHOMA
BRANCH OFFICES: HOUSTON • NEW YORK • NEWARK
EDMONTON • DENVER

Complete CORROSION PROTECTION Service
• Highest quality
magnesium anodes
• Complete Engineering and installation service.
AN·SPEC
AN·SPEC ANODES MANUFACTURED BY MAGNESIUM DIVISION OF M. J. CROSE MANUFACTURING CO., INC.
PIPELINE Anode CORPORATION
25TH WEST AVENUE AND SAND SPRINGS RD.
P. O. BOX 996 • TULSA, OKLAHOMA
PIPELINE SUPPLY COMPANY
PROTECTO WRAP COMPANY

• Men, methods and equipment team-up for efficiency in pipe line construction.
HOUSTON CONTRACTING CO. LTD.
General Contractors
OIL • GAS • GASOLINE • WATER PIPE LINES
2707 FERNDALE • HOUSTON 6, TEXAS
GENERAL PARTNERS
LAURENCE H. FAVROT • R. P. GREGORY
ASSOCIATE
GEORGE A. PETERKIN

by Service Pipe Line Co. When construction is completed late this month by O. R. Burden Construction Corp., Tulsa, the line will be used to bolster the gathering system in the Tioga and Beaver Lodge fields until the Mandan refinery goes on stream. At that time, the line will transport about 30,000 bbl. of crude daily to the refinery.

Arkansas Louisiana Gas To Lay East Texas Line

MARSHALL, Tex.—Arkansas Louisiana Gas Co. is procuring right-of-way for a 14 and 16-in. gas line between its Waskom, Tex., natural-gasoline plant in East Harrison County and its dehydrator station near Longview, Tex., in Gregg County.

The 45-mile line will serve producers in South Hallsville field, which is located about 12 miles southwest of here. A 16-in. line will connect the field and the Waskom plant, with the remainder of the system to Longview being 14-in.

Pipe for the project, which will give South Hallsville field its first outlet since its discovery 2 years ago, has been ordered, and early construction is anticipated.

Kaneb Converts Products Line to Water Service

EL DORADO, Kans.—Kaneb Pipe Line Co. has temporarily converted part of its new 246-mile, 8 and 10-in. products line into a water line to aid refineries in this drought-stricken area.

The line transports about 1.5 million gallons of water daily from Wichita to El Dorado's industrial water system. Both the Skelly Oil Co. and El Dorado Refining Co. refineries faced shutdown because of the water shortage.

Cooperating in the water project are Kaneb's other Kansas refining customers, which includes Anderson-Prichard Oil Corp., Arkansas City; Socony-Vacuum Oil Co., Inc., Augusta; Derby Oil Co., Wichita; Vickers Petroleum Co., Potwin; and National Cooperative Refinery Association, McPherson.

The Kaneb system extends from Augusta northward through the aforementioned cities to Fairmont, Neb.

New Loops in Operation

BARTLESVILLE, Okla. — Phillips Pipe Line Co. has completed and placed in operation 44 miles of 10-in. loops along its products system extending from Borger, Tex., to East Chicago, Ind.

The new lines are located between Paola, Kans., and East St. Louis, Ill.

See Composite and Refinery Catalogs, or Write for Folder On
FLEET-LINE
PIPE SADDLES AND REDUCERS
Nozzle sizes from 1/4" to 24" — ASTM A234
Also for pressure vessel heads
Nominal pipe sizes 1" to 24" — ASA B16.9 ASTM A234
Eccentric
Immediate Delivery
STEEL FORGINGS, Inc.
P. O. Box 2768 • Shreveport, La.
Foot of Fannin Street

S. E. HUEY & CO.
ENGINEERS & SURVEYORS
HENINGER BLDG.
MONROE, LA.
SURVEYING & MAPPING
PIPE LINE SURVEYS

Write or Wire
for Monthly Stock Lists
VALVES
PRESSURE TUBING
STEEL
Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36-A
Shreveport, La.

SANTOPOID 33

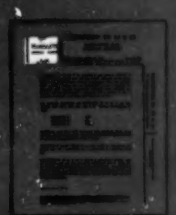
Multipurpose Gear Lubricant Additive and foam inhibitor

Field experience has proved Santopoid 33 an ideal additive for compounding gear lubricants to meet the demands of both high-speed passenger car and high-torque truck and bus operation.

And Santopoid 33 offers an important extra —its foam-inhibitor content. Santopoid 33 contains a stable anti-foam agent that retains effectiveness over long periods of storage. Enough stable anti-foamant is present in Santopoid 33 so that the final gear-lubricant blend is permanently protected against foaming in service.

For more information on this versatile additive, write today to MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 North Twelfth Blvd., St. Louis 1, Missouri.

Santopoid: Reg. U. S. Pat. Off.



MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

Night and day the clock around, week after week, month after month, NATIONAL AIROIL Tandem Combustion Units ceaselessly assure *"continuous operation"* for petroleum heaters in refineries throughout the Nation and the world.
YOU will realize higher profits from YOUR oil heaters when Tandem Combustion Units are specified.
NATIONAL AIROIL has a complete line of Oil and Gas Burners and Furnace Equipment for every requirement.

CHEM-PETROLEUM DIV.

NATIONAL AIROIL BURNER COMPANY, INC.

1236 Sedgley Ave., Philadelphia 34, Pa.
Southwestern Division: 2512 So. Blvd., Houston 6, Texas

The cow, by nature, won't jump the fence . . . The only place we put production fences for ring problems is behind us.

Shirt sleeved engineering in your packing or piston ring problems is something we relish; so "don't fence us in" . . . let us prove to you we can lick your special problems.

Write for Complete Information

- Metallic Packings
- Power Piston Rings
- Carbon-Bakelite Liquid Pump & Compresser Piston Rings
- Valve Discs

FRANCE PACKING COMPANY

9925 Bustleton Ave., Philadelphia 15, Pa.

REFINING

Refining Dividends Past 9 Months Up $16 Million

WASHINGTON.—Publicly reported cash dividend payments by oil refining corporations for the first 9 months of this year ran $16,000,000 above the corresponding 1952 period.

The monthly report of the Commerce Department totaled the 9-months' payments at $726,800,000, compared with $710,700,000 last year, nearly all of the increase centered in the September dividend payments of $233,700,000 over the September 1952 distribution of $218,600,000.

Disbursements by refining corporations account for approximately 22 per cent of the total dividend payments of all manufacturing industries during the 9-month period, and among all corporations only those in the field of finance paid more to shareholders, the department disclosed.

New Booklet Shows Synthetic Catalyst Testing Methods

NEW YORK.—A 48-page booklet entitled "Test Methods for Synthetic Cracking Catalyst" has been published by American Cyanamid Co.'s refinery chemicals department.

The booklet describes standardized testing procedures for measuring some important properties of silica-alumina synthetic fluid cracking catalyst. This includes determination of apparent bulk density, activity, steam stability, thermal stability, particle-size distribution, surface area and pore volume, resistance to attrition, methods of analysis for chemical constituents and impurities, and shipping sampling.

Refining Briefs

WRENSHALL, Minn.—International Refineries, Inc., dedicated its new 11,500-bbl. refinery here recently. One of the features of the new installation is the combination of distillation, catalytic cracking, and polymerization functions into one unit.

TULSA.—Blaw-Knox Co. has been awarded contract to construct a 1,000-bbl. catformer at Anderson-Prichard Oil Corp.'s Cyril, Okla., refinery. The unit will be licensed by Atlantic Refining Co.

WASHINGTON.—Atlantic Refining Co. has received a certificate of necessity from the Office of Defense Mobilization for a quick tax writeoff on an 8,000-bbl. catalytic reforming unit to be installed at the company's 61,000-bbl. Port Arthur, Tex., refinery. The certificate grants a writeoff on 65 per cent of $2,587,470 for the unit, 45 per cent on $541,700 for auxiliary facilities, and 15 per cent on $41,420 for buildings.

WILMINGTON, Del.—The completion of a 14 per cent expansion of tetraethyl lead productive capacity was announced recently by E. I. du Pont

NELSON REFINERY CONSTRUCTION INDEX

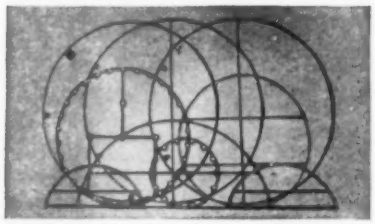
Appears in the first issue each month.
Explanation—"News Items That Appear in Quarterly Cost Indexes," July 7, 1952, pages 105 and 106.
Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July and October.

INDEX (1946 = 100)

	1948	1949	1950	1951	1952	July 1953
Pumps, compressors, etc.	127.0	135.9	138.2	155.9	155.6	165.9
Electrical machinery	127.6	130.9	134.9	154.3	152.4	158.1
Internal combustion engines	116.9	124.8	126.0	146.1	146.5	148.1
Instruments	120.0	122.0	127.8	142.3	146.2	156.3
Heat exchangers	130.0	133.0	140.0	152.0	165.8	172.4
Miscellaneous equipment average	*122.1	*121.6	*126.2	*145.1	153.3	160.3
Materials component	139.3	143.6	149.5	164.0	164.3	176.6
Labor component	128.0	137.1	144.0	152.5	163.1	174.7
Refinery construction index	132.5	139.7	146.2	157.2	163.6	175.5

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the miscellaneous equipment items shown above.

Need GASKETS for HEAT EXCHANGERS?



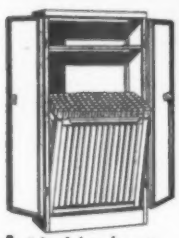
Call CHICAGO-WILCOX for PROMPT DELIVERY

Here is a dependable source for gaskets for heat exchangers. These gaskets can be made in any size or shape as needed—cut from solid metal, sheet-packing; also double jacket type.

Send specifications, blue prints or templates, for quotation and a prompt-delivery schedule for normal stocking orders.

CHICAGO-WILCOX MFG. CO.
7703 Avalon Avenue, Chicago 19, Ill.
Phone: SAginaw 1-1900

CONFIDENTIAL



Ideal for home and field offices.

MAP FILE
MT4
Metal cabinet map file with locking doors. 112 tilting tubes. Easy to file and find maps, tracings to 60".

PATENT NO. 1610368 Other Patents Pending

SCOTT-RICE COMPANY
610 S. Main Tulsa 3, Okla.

VICTOR *ALLOY STUDS*

VICTOR PRODUCTS CORP.
2635 W. BELMONT AVE. • CHICAGO 18, ILL.

de Nemours & Co., Inc. This marks a total increase in du Pont's TEL plant capacity in excess of 100 per cent during the last 3 years. The company also stated that a further substantial increase in TEL productive capacity is under way.

NEODESHA, Kans.—Standard Oil Co. (Ind.) is dismantling and salvaging the first oil stills erected in Kansas at the company's 20,500-bbl. refinery here. The first two stills of the 10-still battery were built when the refinery was completed in 1897. In 1903 and 1904 the other eight stills were added. Company officials said no new construction is contemplated at the site of the old battery.

PORTLAND. — C. M. Corkum Co. will start construction this week on a 595-bbl. oil-packaging plant here for Quaker State Oil Refining Corp. The $250,000 installation, which will have a storage capacity for 17,858 bbl. of motor oil, will be completed and in operation by April 1.

Petrochemicals

New Celanese Pilot-Plant Center Near Completion

SUMMIT, N. J.—A new pilot-plant center is nearing completion for the plastics division of Celanese Corp. of America at the company's research laboratories here.

The center will consist of one building with various units and a control panel for surrounding new open-air pilot plants. The new facilities will primarily be used for work in the synthetic resin and polymer field.

Ammonia Production Rises

NEW YORK.—A new record monthly production of 193,932 tons of synthetic anhydrous ammonia was set in August, according to the latest report of the Census Bureau.

This output was 8,417 tons over July's production. A total of 126,937 tons of ammonium nitrate was produced in August as compared with July's output of 117,946 tons. The figures for the 2 months indicate a firm demand for soil fertilization coupled with new plant capacity.

Expansion of ammonia capacity is almost entirely in plants based on natural gas. So great has been the swing to natural gas, that it now accounts for about 80 per cent of all ammonia production. This compares with less than 7 per cent prior to World War II.

"DEL" DESCO SAYS DON'T LET THIS HAPPEN TO YOU!

If lubricants won't stay in your plug valves . . . YOU NEED

DESCO *Plug Valve* LUBRICANTS

It is a fact that DESCO LUBRICANTS stand up where others fail. But before you buy—test them, convince yourself they are all we claim for them.

ONLY 4 DESCO LUBRICANTS HANDLE ALL VALVE SERVICES

No. 600 All-Purpose Hydrocarbon
No. 750 High Temp. Hydrocarbon
No. 650 All LPG Services
No. 400 Acids and Caustics

CONVENIENT STICKS OR BULK

Packed in clean, convenient sticks to fit Delta Gun, or smaller sticks for jack screw lubrication, or in drums for volume lubricators.

DELTA GUN AND FITTINGS

With Delta High Pressure Gun and one-piece double-check fittings plug valve lubrication is 10 to 15 times faster.

Write for Valve Technical FILE

Complete data on lubricant services, conversion charts, and application of Delta-Desco Plug Valve Lubrication Equipment.

DELTA ENGINEERING SALES CO.
804 Louisiana Ave. Shreveport, La.
Sales Offices in All Principal Cities

DESCO
Plug Valve
LUBRICANTS

PULL A VACUUM AND SWAB THE WELL CLEAN

with GUIBERSON GW CUPS

GW Cups Assembled on famous Guiberson K Swab

Save time . . save money . . save *fluid* . . with GW cups . . with K Swabs — products of Guiberson's more than a third century's experience serving the oil industry.

If you want to *swab*—not just agitate—flexible Guiberson GW cups on the Type K Swab will pull every drop. They hug the casing wall — provide automatic seal and controlled pipe contact — pull a vacuum and clean the well!

Precision molded in Guiberson's own rubber plant from special abrasion resistant compound, GW cups take up their own wear. Made up on the K Swab, they are unexcelled in rough or mixed casing strings — for unloading shallow wells. Won't down-swab or hang on casing collars. Interchangeable on famous K Swab.

THE

GUIBERSON

CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

Among the Drilling Contractors

Dow Joins Midwestern As Contract Representative

Glenn A. Dow, previously associated with Mid-Continent Supply Co., has joined the organization of Midwestern Drillers as contract representative with headquarters in the firm's main offices in the Wright Building, Tulsa.

GLENN A. DOW

Dow, a native of Fort Worth and a graduate of the University of Texas, was with Mid-Continent Supply Co. 6½ years. At the time he left that company he was division sales engineer in the export department with headquarters in New York. Previously he had worked in West Texas, Kansas, and Oklahoma, and before going to New York he had advanced to division machinery manager in Tulsa, where he had been located 4 years.

Midwestern's addition of a contract representative is in line with the company's expanding drilling operations, now largely concentrated in southwestern Kansas-Oklahoma Panhandle area with field operating headquarters at Liberal, Kans. The company, which will be 10 years old next March, is a partnership, composed of J. C. Morrison, general manager, with headquarters at Liberal, and C. W. Wyant and T. F. Hansen, who also are associated with Midwestern Constructors, Inc., at Tulsa. Willis Wyant is office manager at Tulsa.

The firm currently is operating three rotary drilling rigs and three cable-tool drilling-in units, all on contract jobs.

Krug Exploration & Drilling Co., Bakersfield, Calif., is doing the drilling on Pacific Oil & Gas Development Corp.'s new wildcat operation 1½ miles northeast of Jasmine field, in Kern County, California. The test is listed as 2 Quinn, with location in 14-25-27.

Justiss-Mears Drilling Co., Inc., Jena, La., contracting for its affiliate, Justiss-Mears Oil Co., and E. C. Wentworth, of Natchez, Miss., is drilling at its second location in the West Bee Brake area, Concordia Parish, East Central Louisiana. The second test, 1-A Quinn, is located 1,750 ft. southwest of the initial test, recently completed as a discovery well in Wilcox sand at 6,578-80 ft. It is projected to 7,300 ft.

L & W Drilling Co. has taken on a contract for a 7,000-ft. wildcat test to be drilled in the San Jose grant, 4

Although many North Dakotans work on drilling rigs in their home state there probably are not many crews in the state composed entirely of native residents. One such crew, shown in the above picture, is drilling for Loffland Brothers Co. in the Beaver Lodge area. It is composed of (left to right): Ed Tong, Don Jacobsen, Jerome Donnelly, Clyde Hauge, and Carl E. Salveson. Salveson, the driller, was a roughneck on the crew which drilled North Dakota's first oil producer, completed by Amerada Petroleum Corp. in 1951. His two sons, Richard and Glenn, also are roughnecking in North Dakota oil fields.

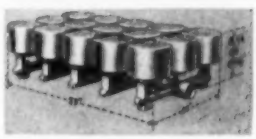
Get Full Joint make-up

A joint can be the weak link in your pumps, sucker rods and drill strings unless they are tightened to maximum make-up.

'Bestolife Lead Seal Tool Joint and Casing Compound keeps out mud, prevents corrosion, permits perfect thread and shoulder contact — yet separates easily years later. Unconditionally guaranteed. Sold at supply houses throughout the world. Packed in 1¼, 5, 20 and 50 lb. containers.

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

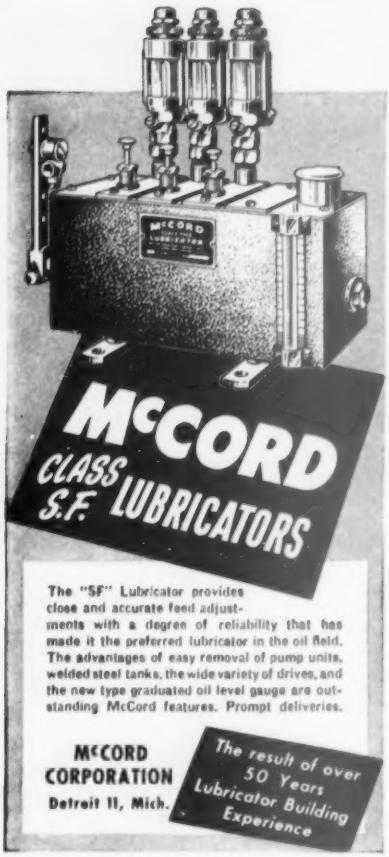
SAVES ON FUEL!

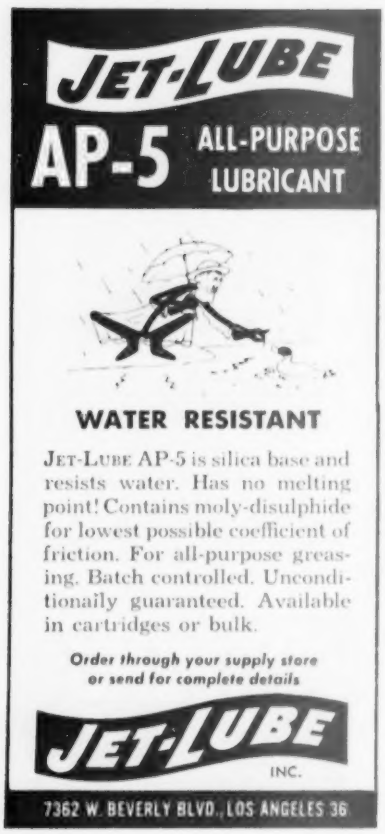


INFERNO Blue Flame
Low Pressure Gas Burner

This INFERNO burner affords important savings on fuel by eliminating fuel waste. Used with good results wherever industrial use calls for hard firing at low cost. Write for free copy of Bulletin 13C.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.


McCORD
CLASS S.F. LUBRICATORS
The "SF" Lubricator provides close and accurate feed adjustments with a degree of reliability that has made it the preferred lubricator in the oil field. The advantages of easy removal of pump units, welded steel tanks, the wide variety of drives, and the new type graduated oil level gauge are outstanding McCord features. Prompt deliveries.
McCORD CORPORATION
Detroit 11, Mich.
The result of over 50 Years Lubricator Building Experience


JET-LUBE
AP-5 ALL-PURPOSE LUBRICANT
WATER RESISTANT
JET-LUBE AP-5 is silica base and resists water. Has no melting point! Contains moly-disulphide for lowest possible coefficient of friction. For all-purpose greasing. Batch controlled. Unconditionally guaranteed. Available in cartridges or bulk.
Order through your supply store or send for complete details
JET-LUBE INC.
7362 W. BEVERLY BLVD., LOS ANGELES 36

miles southeast of Delmita, in northwestern Hidalgo County, in South Texas' Rio Grande Valley area. Contract is with Bass & Vessels, of McAllen, Tex. Rig for the test is coming from North Sun field, in Starr County.

Fortenberry Drilling Co., Natchez, Miss., is starting another well for J. Willis Hughes, of Jackson, in the Sunnyside field, Jefferson County, southern Mississippi. Location is for 2 Hall, in 35-8n-1w. Contract is for 6,000 ft.

I. P. and Fred LaRue, active wildcat operators for their own account in Mississippi and other southeastern states, have contracted to drill a test for Pure Oil Co. in Clarke County, southwestern Alabama. The test, 1 Scotch, is a rank wildcat, located 4 miles north of Chance, in 1-9n-5e. It will be carried to the Lower Cretaceous around 5,000 ft.

Falcon Seaboard Drilling Co., Houston and Tulsa, has contracted for a 9,000-ft. test to be drilled for Superior Oil Co. on the northeast flank of Fausse Point field, in Iberia Parish, Coastal Louisiana. The operation is designated as 1 Provost, with location in 27-11s-8e.

Greyhound Drilling Co., Shreveport, has two additional new wildcat tests under way, one in Miller County, Arkansas, and the other in DeSoto Parish, northern Louisiana. The former, a joint operation with George B. Christmas, of Texarkana, is a 5,500-ft. project, 1 Cooper, located 1½ miles southeast of Fouke field, in the SE SW SE 4-17s-26w. The other, being drilled for Midwest Oil Corp., of Fort Worth, is another 5,500-ft. job, located 2 miles southeast of Keatchie, in 26-14n-15w. It is listed as 1 Atkinson.

ACTIVE ROTARY RIGS*

Area—	Week ended 10-26-53	Change week ended 10-19-53	Change week ended 10-27-52
Gulf Coast	580	—14	+ 12
N. & W. Tex.-N. M.	818	—16	+ 34
Ark.-N. La.-E. Tex.	184	+ 2	+ 31
Oklahoma	333	—33	+ 17
Kansas-S. Nebraska	161	— 2	— 16
Illinois-Eastern	156	— 8	+ 15
Rocky Mountains	299	+ 4	+ 39
Pacific Coast	165	+ 3	— 5
Total U. S.	2,696	—64	+127
Western Canada	157	—13	— 27
Total	2,853	—77	+100

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, and the Rocky Mountains and western Canada areas are shown on pages 195 and 196.

GERONIMO
FOR THE SAFETY OF YOUR MEN
DERRICK ESCAPE MECHANICISM
NET WEIGHT 15 LBS.
GLIDE TO SAFETY ON GERONIMO
(Patent Applied For)
GERONIMO will stand hardest wear and give unfailing protection to refinery and derrick men whose lives are endangered by fire, escaping gases or other hazards.
EASILY ATTACHED OR REMOVED
EXTRA STURDY CONSTRUCTION
QUICKLY STRADDLED
POSITIVE, INSTANT BRAKE
BRONZE "No-Spark" SURFACES
RECOMMENDED FOR ½" WIRE LINE
• Write for Illustrated Folder •
SOLD THROUGH YOUR SUPPLY STORE
— MANUFACTURED BY —
THE CHARLES MACHINE WORKS
PERRY, OKLAHOMA

Geologists prefer
KRAFTBILT
MAP CABINETS!
The all-steel Kraftbilt V-96 Vertical Rollfile is built specially for the job! Holds 96 rolled maps or drawings, tracings, blue prints! Fire resistant! Tamper-proof lock! Disappearing door! Remains perfectly balanced when drawer is fully loaded, fully extended! Send for Bulletin 352-B.
ROSS-MARTIN COMPANY, Box 800-U 423 E. 4th, Tulsa, Okla., Phone 3-6116

NATURAL GAS

Southern Natural to Supply Towns in Atlanta Area

WASHINGTON.—The Federal Power Commission has ordered Southern Natural Gas Co. to supply the Austell, Ga., area near Atlanta with 1,970,000 cu. ft. of gas per day.

Austell proposes to build the necessary pipe-line facilities to transport the gas to that city and other communities in southwestern Cobb County and northern Douglas County. These facilities will include 11 miles line from Southern Natural's system near Campbellton's Ferry to Kithia Springs, Ga., and 2 miles from the latter point to the Austell - Clarksdale - Powder Springs, Ga., area. Other communities will be served by 12½ miles of proposed extensions.

The project, which will cost Austell about $1,800,000, will enable Southern Natural to ultimately supply this new market area with 3,133,000 cu. ft. of gas daily.

Revision of FPC's Earnings Limit on Pipe Lines Asked

LOS ANGELES.—The Federal Power Commission has been urged to change its policy which permits pipeline companies to earn only 6 or 6½ per cent return on their producing properties.

The request was made by Paul Kayser, president of El Paso Natural Gas Co., at an address before the California Manufacturers' Association in Los Angeles recently. Kayser said that a revision in the earnings limitations would encourage development of gas reserves.

"Conditions have changed since the commission's first rate cases were decided in 1940 and 1941, and certainly should be reexamined in the light of new conditions respecting supply," he asserted.

Presently, El Paso supplies 60 per cent of the gas consumed in California and upon completion of a current expansion program will supply 75 per cent.

July Output Up 16.5 M.M.C.F.

AUSTIN.—Texas' gas production rose about 16,543,246 M.c.f. during July over the previous month, according to the Texas Railroad Commission.

July's output was reported to be 435,-434,201 M.c.f. as compared to 418,-890,955 M.c.f. in June. This latest figure is also higher than the production totals in May by almost 3,400,000 M.c.f.

Transmission lines claimed about 277,888,577 M.c.f. of which 178,512,-745 M.c.f. was exported in July. About 42,427,678 M.c.f. was cycled; 34,387,-059 M.c.f. went for plant fuel and lease use; 25,510,493 M.c.f. was used in pressure maintenance and repressuring; 22,429,398 M.c.f. was vented; 16,466,-028 M.c.f. went into carbon black; 16,-144,186 M.c.f. was claimed by extraction-loss plants; and 180,782 M.c.f. in plant meter difference.

Huber Producing New Carbon Black at West Texas Plant

BORGER, Tex.—A new carbon black that reportedly gives 25 per cent more mileage to tires is being produced at J. M. Huber Corp.'s plant here.

Company officials assert that the new furnace black, known as Aromex 125, increases tire resistance to chipping and cracking. The new product, which also will be manufactured at the company's Eldon, Tex., plant soon, is made by thermal decomposition of oil.

Huber pioneered commercial production of "super-abrasion" furnace blacks in 1951.

Texas Eastern's Plans for New Gas Supply Before FPC

WASHINGTON. — A hearing on Texas Eastern Transmission Corp.'s application to increase its pipe-line facilities in Texas to receive new natural-gas supplies was opened by the Federal Power Commission here last week.

Texas Eastern plans to transport the additional gas into its existing transmission system through a network of 17 miles of pipe line and a new 4,400-hp. compressor station. The project will cost an estimated $1,981,900.

August Revenues Up 20.7 Per Cent Showing Steady Rise

WASHINGTON.—Natural-gas company operating revenues were 20.7 per cent greater in August 1953 than in the same month last year.

Operating revenues for the month totaled $152,801,991 against $126,-595,743 in the 1952 period, the commission stated. Operating income was $15,334,748 against $11,827,767, and net income was $7,273,017 against $5,265,380.

For the 12 months ended with August, the 100 companies reporting to the FPC had a net income of $227,-544,562, an increase of 13.9 per cent over the $199,733,270 realized in the preceding 12 months. Revenues aggregated $2,224,106,088, 21.8 per cent over the $1,826,509,847 received in the 12 months ended with August 1952.

Sales to ultimate consumers in August amounted to 199,710,000 M.c.f. compared with 178,045,000 M.c.f. in August 1952.

Natural Gasoline

S.A.E. to Hear Report on Buses Converting to L.P.G.

CHICAGO.—A progress report on the conversion of buses to liquefied petroleum gas will highlight the national meeting of the fuels and lubricants committee of the Society of Automotive Engineers to be held here this week.

Antiknock requirements of passenger cars and the influence of precombustion reactions on engine knock will also come up for added attention.

At the diesel-engine meeting, to be held concurrently, operating costs and performance of the gas-turbine locomotive will be reviewed. Studies of the storage stability of distillate fuels, and a report on an improved automotive diesel combustion system will also prove of interest at this meeting.

Gulf Plans L.P.G. Storage

AUSTIN.—Gulf Oil Corp. is seeking Texas Railroad Commission permission to store up to 30,000 bbl. of liquefied petroleum gases underground in Crane County, Texas.

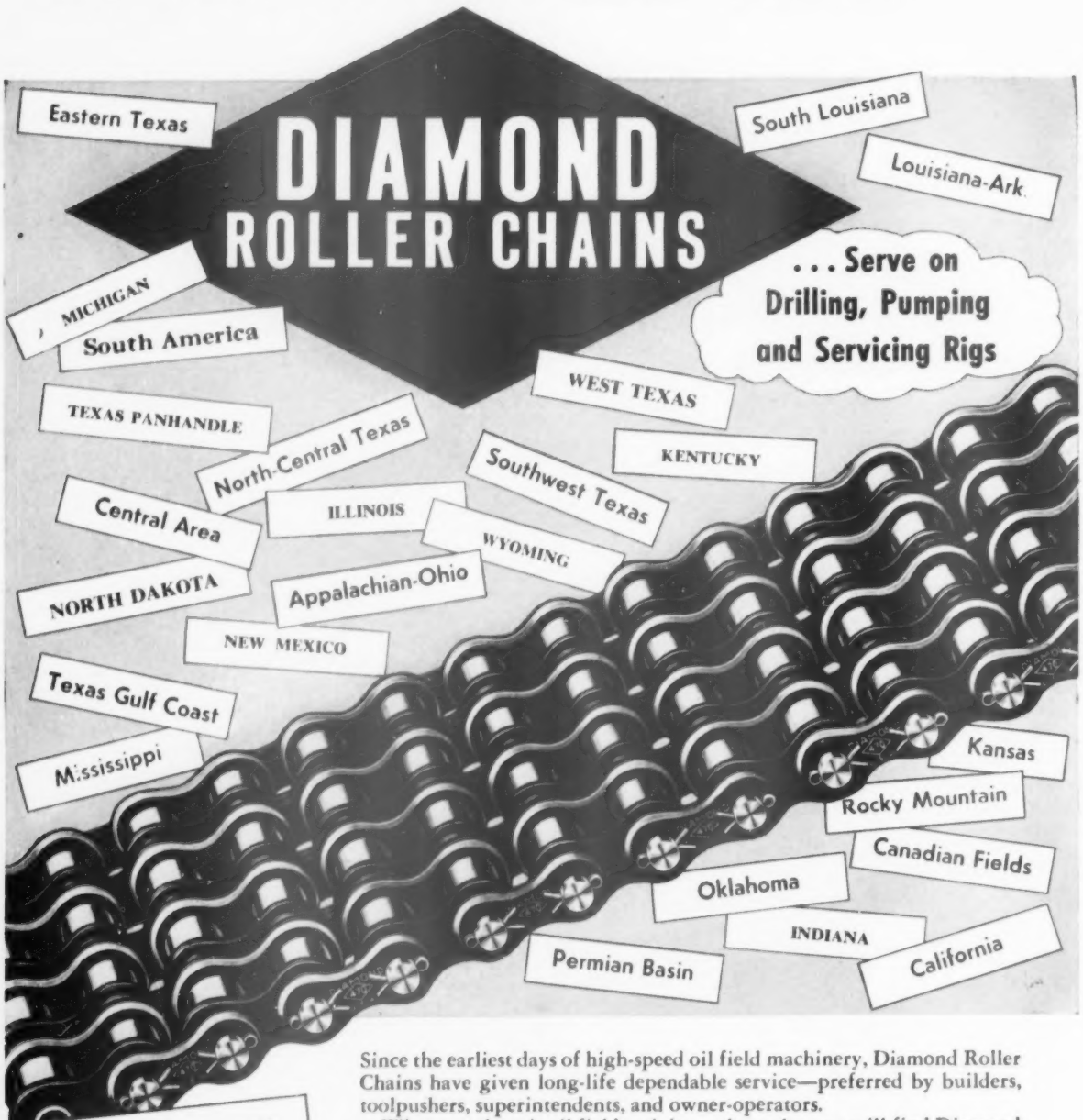
The commission was told that the storage will be used for excess products from the Waddell, Tex., natural-gasoline plant. Gulf plans to use fresh water to clear out a cavity in the salt section at a depth of about 1,190 ft. to 2,104 ft. Disposal of brine water will be in the San Andres formation at depths of 3,607 ft. to 3,950 ft.

Reiter-Foster Sells Plant

REFUGIO, Tex.—Reiter-Foster Oil Corp., New York, has sold its 4,000-bbl. natural-gasoline plant here to Wyrick & Hughes for a reported $107,000.

The former owners procured the plant from Bennett Oil & Refining Co. in June 1952. San Juan Oil Co. operated the facilities for Reiter-Foster.

IN ALL ACTIVE OIL FIELDS



Shot-Peening Since 1944
Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.

And Patented BCL Connector
The patented bushed center plate connector for multiple-strand press fit center plate chain has simplified connecting and disconnecting and assures full value in the chain at the connecting link.

Since the earliest days of high-speed oil field machinery, Diamond Roller Chains have given long-life dependable service—preferred by builders, toolpushers, superintendents, and owner-operators.

Wherever there is oil field activity,—there also you will find Diamond Chains on the finest drilling, servicing and pumping equipment that American builders produce.

DIAMOND CHAIN COMPANY, Inc.
Dept. 475, 402 Kentucky Ave., Indianapolis 7, Ind.
***Tulsa Office:* 2238 Terwilleger Blvd.**
Offices and Distributors in All Principal Cities
Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

EXPLORATION

Williston Interest Is Here to Stay

by Philip C. Ingalls

EXPLORATORY and development drilling in the Williston basin is providing constant encouragement for this still-new area.

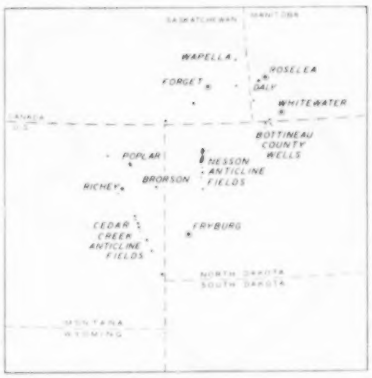
Discoveries of new fields, indications of new pays, completions of successful confirmation tests, and the increasing production potential being developed by methodical in-field drilling are sustaining high interest in the potentialities of this big sedimentary unit.

Recent developments in the Manitoba portion of the basin have substantially increased optimistic thinking about the shallow eastern rim of the area. About 8 miles northeast of the 42-well Daly field, McIvor Drilling Co., Ltd., et al 1 Roselea, 9-28-10-26w1, was completed flowing 118 bbl. of 35°-oil daily on a ¼-in. choke from Mississippian rocks between 2,050 and 2,101 ft. This August completion was the first 1953 discovery for Manitoba and the first flowing well in the province.

Four additional oil wells have been completed in this new field, two of which were spectacular for this area: (1) Imperial Oil, Ltd., 8-28 Virden, a north offset to the discovery, flowed at the rate of 336 bbl. daily through a ¼-in. choke, and (2) British American Oil Co. and Union Oil Co. of California 1 Grose, about ¼ mile east of the discovery well, was completed flowing 40 to 50 bbl. of oil per hour.

Southeast from Daly and only 14 miles north of the North Dakota line, Standard Oil Co. of California 12-16 Whitewater, 3-21w1, is Manitoba's second 1953 discovery. This wildcat well is pumping about 75 bbl. of 34°-gravity oil daily from the Mississippian-Lodgepole at 2,510-39 ft. The Lodgepole is the basal formation of the Madison group. It underlies the Mission Canyon which has yielded nearly all of the Mississippian production in the Williston basin to date.

Over in Saskatchewan, Williston Oil & Gas Co. 1-19 Bobjo, 9-6w2, 3 miles north of Tide Water Associated Oil Co. 1 Forget Crown, found 40 ft. of Mississippian pay without water. The discovery has pumped 125 bbl. of 28°-gravity oil daily from the Mission Canyon at 3,951-88 ft. A ½-mile west stepout was completed dry but a ¼-mile north offset is being started. The new



Williston basin producing areas continue to grow in number and size.

field, believed separate from Forget, is called Moose.

Down in North Dakota, Amerada Petroleum Corp.'s Fryburg discovery has been confirmed by 1 Logan, located ¼ mile to the northwest. The well was completed flowing 207 bbl. of 42°-gravity oil and 54 bbl. of water daily on 22/64-in. choke. Judging from the water cuts in the two completed wells, not much of a field is indicated here unless the completions prove to be edge wells. A third well, now starting ½ mile southeast of the discovery, should give the answer.

Amerada 1 Logan was the first well in North Dakota to recover oil from the Heath. The discovery well had shows in the Heath but they were not tested because of high pressures encountered a few hundred feet up the hole in the Permian - Minnekahta. A drill-stem test of the Heath at 1 Logan recovered some 1,200 ft. of oil but as the sand was only 15 ft. thick a commercial well was not indicated. If, however, the thickness of the Heath is found to be as variable as it is at Beaver Lodge where it jumps from next to nothing to 100 ft. between locations, it is possible that the formation may prove commercial in the Fryburg area. The nearest Heath production is in the Sumatra area of Central Montana, but Heath oil was discovered by field wells at East Poplar within the Williston basin. The only other sand formation within the basin to be found oil bearing was the Triassic-Spearfish in Bottineau County where the formation overlies the beveled edges of Mississippian limestones which are believed to have been the source of the oil.

A long-term interest in the Williston basin has been assured by the results of the past 2½ years' activity.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

OKLAHOMA . . . The Texas Co. 1 Cook, C SW NE 27-1n-19eCM, new Texas County Morrow sand gas strike, gaged 22,250 M.c.f. of gas per day on open flow test of perforations at 6,812-46 and 6,870-94 ft.

COLORADO . . . The California Co. has completed 1 UPRR, NE SW SW 31-8n-66w, second Permian well in Black Hollow field, Weld County, for a pump gage of 320 bbl. of oil per day from the Lyons sand.

WEST TEXAS . . . Gulf Oil Corp. is opening a deep field in western Upton County at 1 TXL "AE," with flowing production found at total depth of 9,220 ft. in lime and shale, probably of Pennsylvanian age. The well produced 204 bbl. of oil in 3 hours.

WEST CENTRAL TEXAS . . . Honolulu Oil Corp. 1 E. G. Whitaker, White Flat field well in Nolan County, is a ¾-mile west extension of the Strawn and a new Cambrian discovery. Potential test on the Cambrian was 118 bbl. of oil in 6 hours from perforations at 5,552-68 and 5,582-5,614 ft.

MISSISSIPPI . . . Magnolia Petroleum Co. has completed 1-A J. B. Snow, 27-13s-7e, New Hope field discovery well in Monroe County, as the first commercial oil producer in the Black Warrior basin.

WHAT'S DOWN THERE?

by R. W. Wire

NO one can accurately answer the question "what's down there?" without digging a hole to find out.

In this effort geologists and drilling contractors are, so to speak, partners in crime. The geologist picks a spot to drive a stake and says "we think there is a possibility that it is down there." The drilling contractor digs the hole to find if what the geologist believes is really true. If, through the combined techniques, oil or gas is located, both are happy. If neither oil nor gas is found the geologist has secured a nice subsurface control point for his map system and the contractor is paid off and starts looking for another stake driven into the ground.

During the year 1952 those who desired wells to be drilled on a contract basis paid to the contractors a little in excess of 1 billion dollars for their services. This is a substantial figure, particularly when viewed in the light of a comparatively young industry —and, one that is transient, to say the least. A contractor has a location for a rig in one locality today, and in 2 or 3 months that same rig may be 10, 50, or even 500 miles away, drilling another well under an entirely different set of circumstances and for an entirely different owner.

There are approximately 4,800 drilling rigs of all types available for use in the United States; 3,600 of these use the rotary method of penetration, while the remaining 1,200 are cable-tool rigs. Of the total 4,800 rigs approximately 85 per cent are owned by drilling contractors, with the remainder being the property of oil-producing companies. There are approximately 950 firms engaged in the contract-drilling business, and this industry has drilled a gradually increasing percentage of the total until at present they are annually drilling 90 per cent of all wells in this country. In 1952 there was completed in the United States a total of 45,885 wells, with a total footage drilled of 186,400,000 ft. Assuming that 90 per cent of all this work was done by contractors, then they completed in excess of 41,000 wells with a total footage drilled in excess of 167,000,000 ft.

Times have changed . . . There was a time a number of years back when the only competition encountered among drilling contractors lay in the question of who had an available rig which could be gotten into a given location and spudded in the quickest. The question of costs for the services rendered was not a matter of too much importance, as the oil company was primarily concerned with getting into that oil reservoir ahead of everyone else—as it was interested in getting the most oil out of that reservoir in the shortest possible time. At least since World War II the economics of producing oil has made us realize that a very wasteful operation was being carried on, and that if we were to conserve our natural resources, drilling programs should be placed on a well-engineered basis designed to secure the maximum recovery at the lowest cost. This transferred the spotlight of competition from availability of a rig to the question of who could do it the cheapest.

The effects of this transfer of emphasis from speed to cost can best be illustrated by examining comparative rig costs, rig revenues, and rates of penetration. Today rig operating costs are approximately 32 per cent higher than they were in 1947, while revenues from drilling operations are 7 per cent less than they were in 1947. These facts would represent a very serious situation so far as the contractor is concerned were it not for the substantial increase in the rates of penentration, which today are 68 per cent greater than in 1947. During the past few years the average depth of wells drilled in the United States has gradually increased, requiring an ever-expanding amount of capital investment in order to supply the oil industry with the proper size rig to meet its requirements.

The question of availability of equipment of proper specifications is but one reason why the drilling contractor has, year by year, drilled a greater percentage of all wells. Through the contractor's combined availability of equipment, the operator has at his command the necessary tools at a lower cost than he could provide them for himself.

For example, if a large oil company embarked on a drilling program during any one year of, say, 500 wells, spread throughout the oil-producing areas of the United States, with average drilling time per well of 70 days, he would complete five wells per rig per year—and therefore would require 100 drilling rigs during that year to complete his program. If the following year his program were reduced to 400 wells he would require only 80 rigs.

If it were necessary for him to own his own equipment, he would in the first place have a large amount of money tied up in the purchase price of the 100 rigs—but his greatest concern would be with the second year, when the 20 rigs standing idle would represent a frozen asset with an original cost, based on today's figures, of some 5 million dollars. This figure is arrived at based on the average cost of rotary drilling rigs, which today is $250,000. By contracting for the use of such equipment the operator in effect becomes a member of a pool which will always have available the proper size rig in the required location when he needs it.

Rig costs . . . Don't be misled by reference to the cost of the average drilling rig as previously mentioned at $250,000. Today this amount would purchase a well-equipped rig capable of a maximum depth of 8,000 ft. A rig capable of drilling 3,000 to 5,000 ft. costs about $150,000, while a big rig capable of drilling in excess of 15,000 ft. would cost in the neighborhood of $600,000—all figures include the investment in drill pipe.

While the investment approach is one of the prime considerations in the growth of independent contracting, there are of course other factors which have contributed. We live today in an age of specialists, and the contractor's entire operation is dedicated to improvement in the techniques of drilling, in order to increase the rate

of penetration, while at the same time reflecting all possible cost reductions. This is his life's blood, and unquestionably he has contributed greatly to the increased efficiency of the industry.

Geology Cuts Costs

We previously mentioned that today's emphasis is on the cost of drilling wells, and that contracting has become highly competitive. In this respect the advice and decisions of the geological branch of the petroleum industry unquestionably play an important part in the actual profit-and-loss status of the drilling contractor. The decisions of this group as to where the well shall be drilled, the information given to the contractor as to how the well shall be drilled, and the publishing of a complete record of wells with geological tops, sections, etc., will actually control the bids made by many contractors.

I say "many contractors" because, unfortunately, there are some in the industry who pay little or no attention to the available history with respect to locations, and simply make a blind bid based on a rank guess as to the number of days it will take to complete. This is not the practice of the more representative contractors, for they have learned through bitter experience that a minute review of available information will usually provide a clear concept as to conditions to be encountered. And when a bid is founded on this kind of information the work completed becomes a source of satisfaction to all concerned.

THE AUTHOR

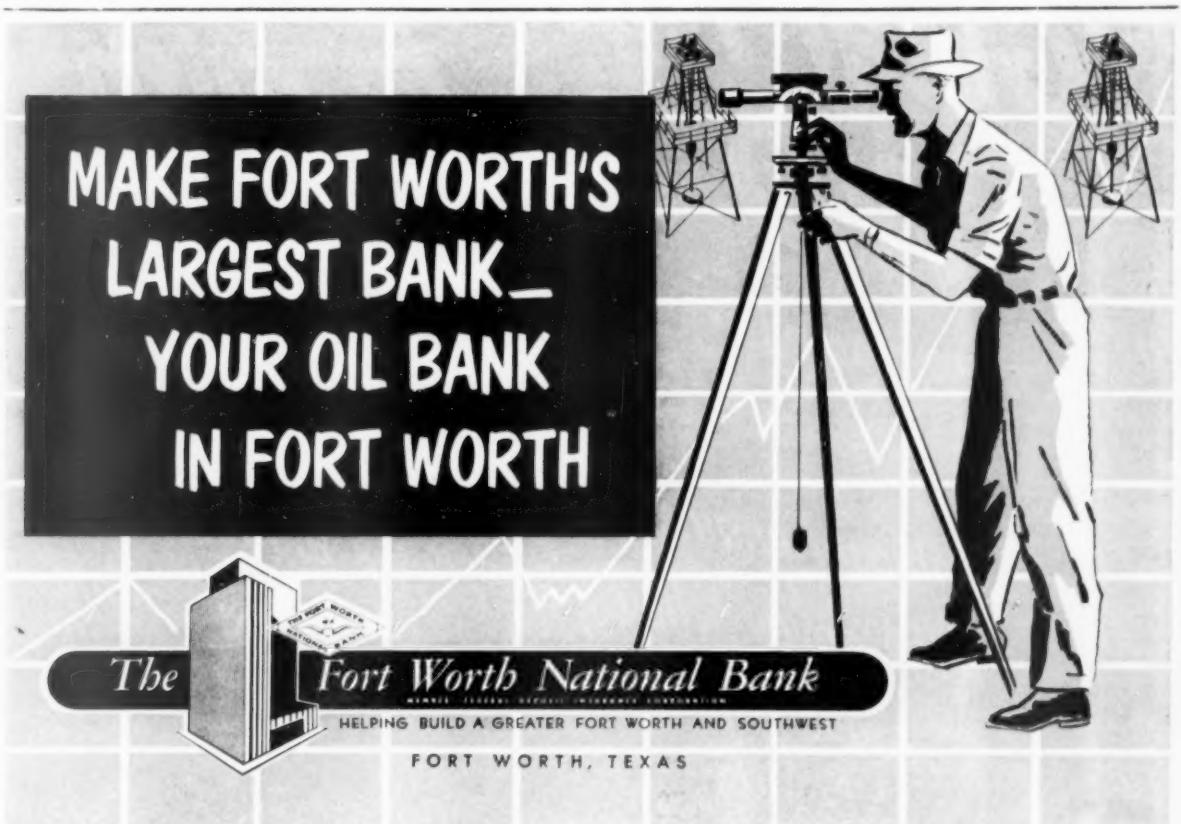
R. W. Wire is president and general manager of Loffland Brothers, Tulsa, the world's largest drilling company—it has 88 rigs operating in the United States, Canada, Venezuela, and Peru. His discussion of the value of geology to the drilling contractor was presented to the Tulsa Geological Society last month.

How geology aids . . . To give you an idea of the use to which we put information which we gain from the excellent correlations of geologists, some time ago the West Texas Geological Society compiled cross-sectional information covering an area of 63 miles from central Winkler County to central Midland County, Texas.

There were eight wells involved, and they were plotted to show the thickness of chert and cherty formations from the Upper Mississippian through the Devonian and Montoya sections. The distance between the wells in this cross-section varied from 4 to 20 miles. The total thickness of the chert sections in the eight wells varied from 188 to 1,124 ft. A smart contractor using this information would not make the mistake of using the same number of days drilling time for any well he might drill any place in that area. Unfortunately, there are some contractors who pay no attention to the established facts, and do bid on the basis of the same drilling time to a given depth, even though the locations may be much farther apart.

In this particular area he would find that his costs of drilling the chert section alone of the eight wells mentioned would range from $5,500 to $32,000. If he had guessed at the amount of chert on the basis of one well with a 188-ft. section, and actually drilled in the area with the 1,124-ft. section, his costs would have been approximately $27,000 higher than anticipated.

It is not difficult to understand why the drilling contractor is gradually learning to profit by available geological information—and I am quite sure that if the day ever comes when such information is properly used by all contractors, you will probably hear less conversation about being forced to take wells at too low a price.



NOW

Great New Line of FWD Trucks with

MATH • MATIC DESIGN

A significant engineering achievement which puts the power where there's work to be done by properly proportioning weight and torque

FWD MATH-MATIC DESIGN *for*

Greater Economy—30 to 37% more tire wear!*

Greater Performance—40 to 82% more tractive ability!*

*Greater Safety**

Now, it's top truck performance at minimum operating cost, thanks to exclusive FWD Math-Matic Design, the most important advancement in 43 years of heavy-duty truck leadership.

Now, it's an all new line of FWD "Fourmaster" and "Sixmaster" series trucks with the widest range of G.V.W.'s in the industry . . . plus 15 other big features to give you more service for your truck dollar.

FUNCTION-ALL STYLING for easy mounting of snow-plows, underbody blades, dump bodies and other equipment. Choice of crown or military-type fenders.

RIGI-TAPERED FRAME—25% stronger. Heat-treated alloy steel. Deep taper design *rigidizes* front end for mounting plows and other equipment, distributes load over entire frame. Above-frame area unobstructed for easy mounting of bodies and equipment.

REAR AXLE—30% stronger. Full-floating. Diameter increased from 1.812 to 2.000.

POWER PROPORTIONING CENTER DIFFERENTIAL—Not only power on *all* wheels, but properly proportioned power for maximum performance at minimum operating cost.

EASY-ACCESS HOOD—Removable side panels and "butterfly" hinged top sections permit instant access to engine, despite close-mounted auxiliary equipment. Radiator filler cap conveniently located *outside* hood.

TRUNION-MOUNTED RADIATOR—Floating construction, isolated from frame by rubber. Takes the tough shocks without cracking core, shell or hood.

VALVE-IN-HEAD ENGINES in all trucks—light weight, high power output. Diesel engines available for all models.

CUSHIONED ENGINE MOUNTINGS—FOURMASTER and SIXMASTER series engines are three-point rubber mounted; quieter, vibration-free.

12-VOLT ELECTRIC SYSTEM—Quick power-surge for cold weather starting; hotter spark, less loss of current under heavy lighting loads.

HEVI-DUTY STEERING GEAR and linkage assures positive control under roughest operating conditions. Lessens road shock and vibration, makes steering a cinch. Power steering optional on all models.

COMFORT CAB—Lots of leg room. Picture-window visibility. Cab hood is three-point rubber mounted. Adjustable seat, of light, strong tubular frame construction. Tip-out instrument panel for easy access. Minimum floor openings for greater protection from fumes and cold. I.C.C approved outside-mounted fuel tank.

STIRRUP-ACTION CLUTCH & BRAKES—Power assisted brakes, hydraulically assisted clutch. Suspended design of both pedals for easier servicing . . . provides "stirrup" action for greater leverage, regardless of driver's height.

POWER OPERATED CENTER DIFFERENTIAL LOCK—FWD Center Differential Lock manually controlled but power-actuated. Red dashboard light warns when lock is on.

LONGER FRONT SPRINGS insure easier riding, improved steering geometry. Ox Bow tied in with spring mounting brackets for greater frame strength.

FULL-BRUNT BUMPERS—25% stronger. Lighter, tougher heat-treated alloy steel.

**TRUCK RESEARCH PROJECT conclusions. For detailed data on 7 years' research conducted by the University of Wisconsin's College of Engineering, write now for your free copy of "The Truck That Went to College"*

THE FOUR WHEEL DRIVE AUTO CO.

CLINTONVILLE, WISCONSIN • Canadian Factory KITCHENER, ONTARIO

NOW... See your FWD dealer. He knows!*

FWD

MATH-MATIC DESIGN

Another example . . . It is common practice on locations where little or no definite geological information is available, to contract for the drilling of a well on what is known as the day-work basis, wherein the contractor charges X dollars per day for the use of his rig and equipment, which cost goes on for every day that the rig is on location. Good geological work often enables a footage bid in situations of this kind where it has been possible to project the thickness of a section which may be particularly difficult to drill.

An example of such a case occurred recently wherein the North Dakota Geological Society projected the thickness of section expected from the Charles to the Red River formation in a well to be bid between two completed wells 60 miles apart. This projected thickness of section in the proposed well was extremely important in preparation of the bid, as it was to be on a footage basis to total depth—and since this older and harder section could be the most difficult to drill, we were benefited by knowing something about the formation that would be encountered.

In this particular case the harder section of the well varied from 2,000 to 3,250 ft., or in cost to drill, from $27,000 to $44,000. Here again we were tied to geological decisions because of the choice of location, but also were assisted by having available to us records compiled by geologists with regard to depth of formation to be encountered.

Cooperation pays off . . . In most areas of hard-rock country, such as are encountered in West Texas, Oklahoma, and the Rocky Mountains, the contractor's bidding becomes more accurate based on good geological information, and at the same time during the drilling of the well the advice of the geologist again becomes important, as many long and costly trips for bit changes can be eliminated by drillers working with the records of the geologists as the well is being drilled.

In is evident, therefore, that the geologist and the drilling contractor, working together, can contribute much to the desired reduction in the cost of completing wells. Even in well-defined fields, circumstances occur where geological advice, substantiated by offset information, provides a saving in cost. Sometimes it is possible for a geologist to permit a well to be drilled (barring lost-circulation zones) with water, to a point reasonably close to the pay section. This can easily involve a substantial saving in cost.

I recall a well drilled in eastern New Mexico from under the intermediate string at 4,300 ft. to a depth of 9,700 ft., with water—reaching this depth which was several hundred feet above the pay zone, in 51 days—while on an offset well the same footage was drilled, but, using 9 to 9.8-lb. mud required for samples, it took 68 days to drill. At a rig cost of $1,100 per day it cost $56,000 to drill the section with water, and approximately $75,000 when drilled with the mud program required to secure samples — or a difference of $19,000 between the two methods of procedure. Therefore, the manner in which the geologist develops a mud program in a field can affect the well cost by many thousands of dollars.

The tenor of my opening remarks might appear to indicate that when we determine "what's down there?", it is a matter of divided interest, with the geologist selecting the location and the driller boring the hole. I have attempted to point out that it is a joint enterprise, with the techniques of the geologist closely allied with those of the driller, both working in close cooperation and each benefiting by the advice of the other. Each of us in our own way must carry the responsibility of improving our separate techniques —but come drilling date, we pool our efforts toward the common end of finding new reservoirs while continuing to develop proven areas, at the lowest and most efficient cost.

PRINCIPAL PRODUCTS IN STOCK

CARBON STEEL BARS—Hot rolled and cold finished.

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Many types including Inland Safety Plate

SHEETS—Hot and cold rolled, many types

TUBING—Seamless & welded, mechanical & boiler tubes

ALLOYS—Hot rolled, cold finished, heat treated

STAINLESS—Stainless bars, plates, sheets, pipe, etc.

MACHINERY & TOOLS—For metal fabrication

Steel for maintenance and repair or steel for new construction—Ryerson is prepared to meet practically any demand from the largest and most diversified stocks in the country. Carbon steel, alloys and stainless are immediately available in an unusually wide range of types, shapes and sizes. Ryerson sawing, shearing and flame-cutting equipment is on hand to prepare steel to your specification. And experienced Ryerson steel men are also always ready to help you solve any special problems. So for all your steel requirements—pounds or tons—call your nearby Ryerson plant.

RYERSON

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

OKLAHOMA

Second Well at North Roulette Being Finaled

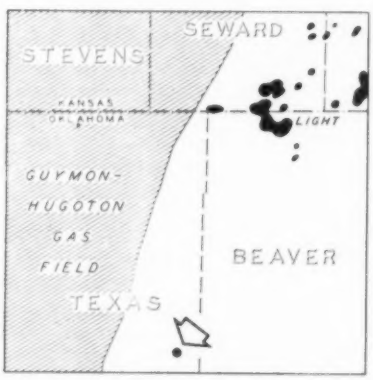
Cleveland County's new North Roulette pool has its second well nearing completion. Sinclair Oil & Gas Co. 1 Goodin, SW NE SW 34-9n-1e, flowed 399 bbl. of 38°-gravity oil in 24 hours through a 24/64-in. choke with 248 M.c.f. of gas per day from open hole in the second Wilcox sand at 6,260-64 ft. The pool was opened at Ohio Oil Co. 1 Thomas Goodin, NE NW SW 34-9n-1e, last summer.

Ashland Oil & Refining Co. 1 Dillard, C NE SW 17-9n-3w, flowed 1,500 M.c.f. of gas per day and recovered 135 ft. of distillate after a drill-stem test at 9,264-9,310 ft. The operator has resumed operations.

North in Oklahoma County Calvert Drilling Co. et al 1 Redmund, NW NW NE 24-14n-4w, south stepout to new Northwest Edmond pool, is going on the pump after swabbing 98 bbl. of oil in 24 hours from perforations in the first Wilcox sand at 6,550-6,610 ft.

Springer Strike Finaled In Southeast Bradley Area

Phillips Petroleum Co. is completing a Springer sand discovery well in the Southeast Bradley area of Grady County, Oklahoma. The 1 Lack, flowed 208 bbl. of 43.9°-gravity oil per day through a small choke from the lower portion of an 80-ft. pay section topped at 9,348 ft. The new discovery is 6 miles from the nearest Springer sand production.

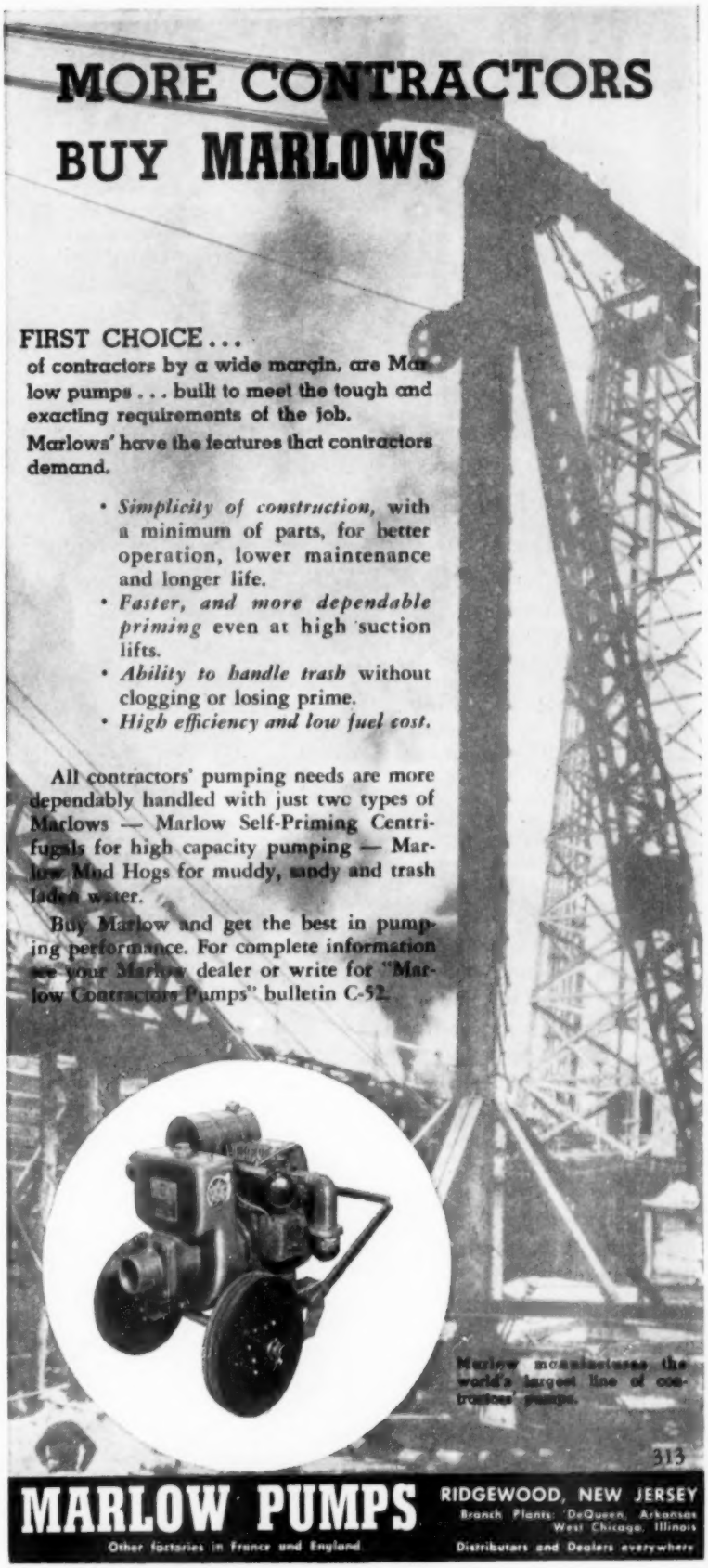


Arrow points to The Texas Co. 1 J. H. Cook, C SW NE 27-1n-19eCM, new Texas County Morrow sand gas reservoir. The discovery gaged 22,250 M.c.f. of gas per day on open flow test of perforations at 6,812-46 ft. and 6,870-94 ft.

New Osage Area Expands With High Volume Well

Gross Drilling Co. has completed a big well at 2 Osage, NE SE SE 13-25n-6e, in one of the best new producing areas in Osage County since the opening of Northeast Little Chief pool.

The well flowed 1,238 bbl. of oil in 24 hours during open-hole tests in the Burbank sand. This well makes the fifth good producer completed since opening of the new pool in September. The discovery well was made by Kewanee Oil Co. in the NW NW NW 19-25n-7e. This well flowed 254 bbl.


MORE CONTRACTORS
BUY MARLOWS
FIRST CHOICE...
of contractors by a wide margin, are Marlow pumps... built to meet the tough and exacting requirements of the job.
Marlows' have the features that contractors demand.
• Simplicity of construction, with a minimum of parts, for better operation, lower maintenance and longer life.
• Faster, and more dependable priming even at high suction lifts.
• Ability to handle trash without clogging or losing prime.
• High efficiency and low fuel cost.
All contractors' pumping needs are more dependably handled with just two types of Marlows — Marlow Self-Priming Centrifugals for high capacity pumping — Marlow Mud Hogs for muddy, sandy and trash laden water.
Buy Marlow and get the best in pumping performance. For complete information see your Marlow dealer or write for "Marlow Contractors Pumps" bulletin C-52.
Marlow manufactures the world's largest line of contractors' pumps.
313
MARLOW PUMPS
Other factories in France and England
RIDGEWOOD, NEW JERSEY
Branch Plants: DeQueen, Arkansas
West Chicago, Illinois
Distributors and Dealers everywhere

WECO ... the UNIONS you can trust for Sealing and Service

Selected Raw Materials

Advanced Manufacturing Practices

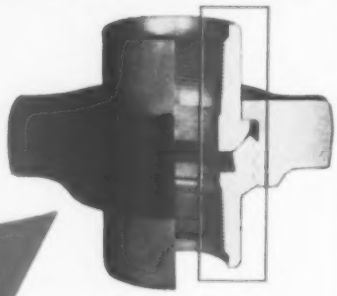
Ball and Cone Seat

Rugged Acme Threads

Heavier Wall Sections

Precision Seating Surfaces

• Two WECO Fig. 602 Unions on a high pressure line.



Heavier Wall Sections

• The sub ends are vitally important to the ruggedness and strength . . . the long service and perfect sealing you get from WECO Unions. That's why the subs have extra heavy wall sections . . . are turned and knurled for uniform thickness and strength.

Their extra strength is positive protection against distortion, vibration and shock pressures. Pipe threads are precision machined and carefully checked for proper taper, length and lead.

The heavier wall sections . . . the extra care in machining and threading . . . the turned and knurled sub ends are all part of the extra quality features that make WECO the Unions you can trust for sealing and service.

PESA

It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.

Division of Chiksan Company
HOUSTON 1, TEXAS

CHIKSAN COMPANY

Brea, Calif. Chicago 38, Ill. Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

of oil per day on completion tests. The south offset to the new pool flowed at the rate of 725 bbl. per day. Gross's 1 Osage, SE SE SE 13-25n-6e, flowed at a high rate, and was then pinched back on tubing. The 3 Osage is beginning in the SE NE SE 13. Kewanee's 3 Osage, NE NW NW 19-25n-7e, an east flank well, was completed for 81 bbl. of oil in 3 hours through 3/8-in. choke out of open hole at 2,821-47 ft. Kewanee has three other active tests in the NE of 24-25n-6e. Only one dry hole has resulted from this intensive drilling development program. A well in the SW SW SW 18 flowed 374 bbl. of oil after fracturing in 5½ hours through ¾-in. choke. Two other wells are under way in this same tract.

New Pools Named

The Oklahoma Nomenclature Committee of the Kansas-Oklahoma Division of the Mid-Continent Oil & Gas Association has named 15 new pools in the state, one of them one of the most significant discoveries in several years.

Yellowstone pool is the name given Champlin Refining Co.'s 1 Harry Diamond, NE NE SW 17-29n-17w, Woods County Arbuckle-Simpson strike, opening first production in this section of Oklahoma.

Carter County's new pool, West Joiner City, was opened by Woodward & Co. at 1 Barker, NW NW NW 33-4s-3w. Southwest Clear Brook is a new pool in Cleveland County, opened by Continental Oil Co. at 1 Cook, SW SE NE 15-8n-1w. North Welty is a new Creek County pool, opened by Roy G. Woods at 1 Dumas, NW SE SE 31-14n-9e. Another Creek County discovery is Grant H. Bagley & R. P. Goldswarthy's 1 Baker, SE NE NE 6-18n-8e, opener of Northwest Olive pool.

South Brown is a new pool in Garfield County, opened by Delaney Drilling Co. 1 Burl Cline, SE SW NE 22-20n-4w. Magnolia Petroleum Co. 1 Allison, NW SW NW 22-4n-2w, Garvin County, opened Maysville pool. Phillips Petroleum Co. 1 Lack, C SW SE 35-5n-5w, Grant County, opened Bradley pool. W. B. Cleary, Inc. opened Southeast Braman District pool at 1 McKee, SE SW NW 20-28n-1w, Kay County. West Mount Vernon is a new pool in Lincoln County, opened by Jernigan & Morgan 1 Starling, NE NE NE 8-15n-3e. Northeast Iron pool in Murray County was opened by C. E. Moore and E. T. Fairman 1 Cozad, C N½ SW 21-2n-3e.

Pace Petroleum Co. 1 Marshall, NE NE NE 9-21n-2w, Noble County, opened North Sams pool. In Osage County Waite Drilling Co. opened South Pioneer pool at 1 Osage, SW SW NE 17-20n-11e. Northwest Center pool is a new Pontotoc County area, opened by John H. Stapleton 1 Norris-Law, SE SE NE 11-4n-4e. Viersen & Cochran 1 Johnson, NE SE NW 2-8n-2e, Pottawatomie County discovery, opened Southwest Morvin pool.

MICHIGAN

MICHIGAN

Don Rayburn set 5-in. casing at 3,350 ft. in preparation for perforation and test of Detroit River horizon oil showings at his 1 Lounsbury-Perry et al, SW SW SW 31-14n-11e, Elkland Township wildcat, Tuscola County. This wildcat is now being considered as one of the most important exploratory wells now under test in the state, and in many quarters the oil porosity sections which will be tested are considered to look very favorable. Most of the pays to be perforated are those which were not cored,

but which showed up on an electric log survey.

Rayburn's wildcat was drilled to a total depth of 3,541 ft., through the Richfield horizon. Black lime, Richfield base, was logged at 3,438 ft. The log porosity zones were reported at 3,043-48, 3,084-90, 3,148-54, and at 3,252-53 ft. Attempts to run 2 double packer drill-stem tests of the zones from 3,043 to 3,250 ft. failed and these failures, at least in part, prompted the setting of 5-in. casing at this time.

One other porosity zone in the Detroit River, a section which was cored, will also be perforated and tested. This horizon was tested at 3,145-95 ft. Tool was open for an hour and 5 minutes. At the conclusion of the test, drill-pipe carried 2,400 ft. of gas, 150 ft. of sur oil and 25 ft. of oil and gas-cut drilling mud.

The 1 Lounsbury-Perry et al is located about ½ mile due west of the famous Tom Palmer-Roy Gordon 1 Palm Book Land, SE SE SW 31-14n-11e, which was a near-commercial producer in the Dundee-Detroit River zones when it was drilled in 1946. The 1 Palm Book Land was drilled on a Shell Oil Co. picture and on acreage farmed from Shell. It was a well which stirred considerable interest in the Thumb area at the time that it was being tested.

KANSAS

Arbuckle Discovery Seen For Southeastern Rush

Barbara Oil Co. has pipe set in the Arbuckle lime at 1 Schraeder "A," SW SW SW 18-19s-17w, 6 miles southeast of Rush Center pool and 6 miles northwest of Ryan pool, Rush County.

The indicated discovery recovered 125 ft. of heavily oil-cut mud and some free oil on a drill-stem test in the Arbuckle at 3,931-51 ft.

Mississippi Strike Seen for Barber County

Barbara Oil Co. has casing set in the Mississippi at an indicated discovery, the 1 Forester, SW NW NE 28-33s-11w, 1 mile south of Rhodes pool.

Recovery on a drill-stem test at 4,517-67 ft. was 30 ft. of oil and gas-cut mud and 990 ft. gassy oil.

Pump Going Up At Edwards Lansing Test

Natural Gas & Oil Co. is installing pump after swabbing 5 bbl. of oil per hour for 6 hours at 1 Enlow, SE NE NW 9-24s-16w, 3 miles southwest of Bradbridge pool in Edwards County, off the southwestern flank of the Central Kansas uplift.

The swab test following acid treatment, was in perforations in the Lansing at 3,736-43 ft.

Flowing Strike Nears Finale in Stafford

Greenland Drilling Co. is completing a flowing Lansing discovery in Stafford County at 1 Birdsall, SE NE SE 21-23s-14w, 1 mile south of Crissman pool in the west-central part of the county.

A flow of 35 bbl. of oil in 1 hour after acid treatment was reported through perforations at 3,690-97 ft. Final test showed

Wichtex Units are simple, rugged, efficient machines that provide an all-round economical operation, thus place you in a strong competitive position for getting business and showing a profit.

You save substantially on original price, as compared with comparable models in most competing lines—and you save all along the way, in low upkeep costs. There's where the profit lies, in the well servicing business!

Compare price, compare upkeep costs, compare ease and efficiency of operation . . . and you'll find that Wichtex Units are your BEST BUY.

PORTABLE ROTARY RIGS

ROD, TUBING & BAILING MACHINES • DRILLING IN & CLEAN OUT MACHINES

WICHITA FALLS, TEXAS

10 bbl. of oil flowing in 10 minutes after a shut-in period of 4 hours. Operator is setting tanks.

CANADA

Light Oil Strike Seen In North Pembina Area

A team of five American and Canadian oil companies, headed by Socony-Vacuum Exploration Co. has struck a flow of light-gravity crude oil at a wildcat in the North Pembina area of central west Alberta, 62 miles southwest of Edmonton. This oil success, which may be a new discovery, or may be an extension to a discovery that was chalked up earlier this year, found its crude in the Cardium sand formation.

The discovery was recorded when a 50 minute drill-stem test in the Cardium interval 4,946-57 ft. Natural gas flowed in 5 minutes and oil flowed in 40 minutes. Recovery was 4,900 ft. of clean 37°-gravity crude oil. Top of the Cardium was found at 4,952 ft., or 2,007 ft. below sea level, compared with 2,277 ft. below set level at the group's first discovery in this area.

The new oil strike came at Socony-Seaboard 11-13 North Pembina, LSD 13, 11-49-8w5, which is 6¼ miles northeast of the Socony-Seaboard 1 Pembina Cardium oil discovery well which produced 37°-gravity oil at rate of nearly 400 bbl. daily during flow test following treatment of the formation. The 1 Pembina well found around 46 ft. of sand development, including 35 ft. of assured oil pay and 11 ft. that was partially gas zone. The No. 11-13 well is the group's third exploratory well in this program. The second, Socony-Seaboard 33-7 Drayton Valley, 5½ miles northeast of the new strike, was abandoned last month.

Hamilton Lake . . . Long Island Petroleums, Ltd., and Poplar Oils, Ltd., have indicated oil success at their exploratory driller in the Hamilton Lake area of Alberta, 130 miles northwest of Calgary.

The well, Long Island-Poplar 6-21 Ranchmen's, USD 6, 21-35-9w4, is 1½ miles northeast of the Dragon 6-17 Ranchmen's Viking oil well and 1⅛ miles north-northeast of B. E. 8-16 Ranchmen's dry hole. A 2-hour drill-stem test from 2,956-84 ft. flowed gas in 52 minutes and gave a recovery of 180 ft. of clean oil and 32 ft. of oil-cut mud. Hole was taken down to 3,006 ft. and string of 5½-in. casing has been set.

Fairydell-Legal area . . . Imperial Oil, Ltd., has discovered 23°-gravity crude oil in the basal quartz section of the Cretaceous at a step-out driller in the Fairydell-Legal area, 20 miles due north of Edmonton. This well had previously flowed natural gas at rate of 5,900,000 cu. ft. daily during test in the Viking sand.

The new oil strike came at Imperial 10-8 Fairydell, LSD 10, 8-57-24w4, which is 2½ miles northeast of Morinville are Cretaceous oil wells and 1¾ miles west-northwest of the N.L.U. 6 Legal, Viking gas well. A series of drill-stem tests run over the basal quartz interval 3,408 to 3,453 ft. gave up varying amounts of 23°-gravity oil, ranging up to 900 ft. in 1-hour tests. The well is currently drilling below 3,708 ft.

Saskatchewan . . . Canada Southern Oils, Ltd., has struck a small flow of natural gas in the Viking sand at an exploratory well being drilled in west Saskatchewan, 18 miles northeast of Kindersley. This wildcat is in the Cook Lake area.

The gas flow came at Canada Southern-New Superior 11-32 Cook Lake, LSD 11, 32-31-21w3, which lies about 3 miles southwest of the Superior group's 1 Dodsland, abandonment and 20 miles east of Imperial's recent Viking oil discovery well at Smiley. Viking drill-stem test from 2,202-31 ft., through ½-in. choke, flowed gas at maximum rate 800,000 cu. ft. daily. Crew is now running string of 7-in. casing, to shut off the gas, preliminary to deepening the hole.

KENTUCKY

WESTERN KENTUCKY

In McLean County Rodger Badgett has finaled 1 Ellis-Sheets unit, 9-L-26, 3 miles northwest of Happy Hollow, for an initial production of 312 bbl. of oil per day, following fracture treatment of the Jackson sand at 2,287-94 ft. Total depth at the flowing discovery is 2,716 ft. This is the first Jackson production in this immediate area.

EASTERN KENTUCKY

In the Pike County sector of Big Sandy gas field, United Carbon Co. have completed their 28 Republic Steel Corp. as a Maxon (Mississippian) sand gas well. Producing formation was topped at 1,961 ft. and bottomed at 2,021 ft. Well flowed naturally at the rate of 2,572,000 cu. ft. of gas daily.

Also in Pike County, United Fuel Gas Co. have completed 8029 Kentland Coal & Coke Co., as a Devonian brown shale gas well. Devonian shale was topped at 4,035 ft. and penetrated to a total depth of 4,970 ft. and completed, after shot, for 353,000 cu. ft. of gas daily.

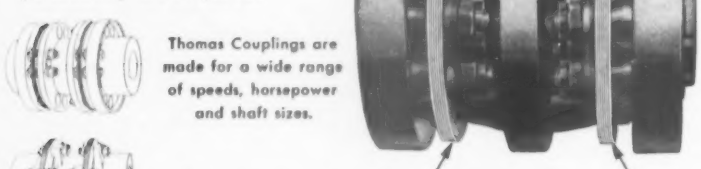
AVOID COSTLY SHUT-DOWNS!

DISTINCTIVE ADVANTAGES of THOMAS ALL-METAL COUPLINGS	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

Specify THOMAS Flexible Couplings for Power Transmission

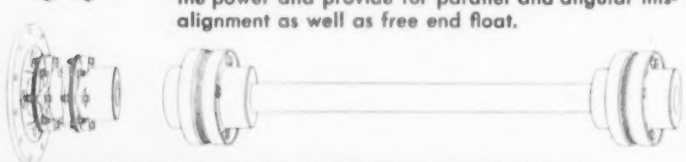
REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

You can use Thomas Couplings to your advantage on Pumps, Compressors, Cooling Towers, Rigs or any other tough job where continuous operation and dependability are required.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



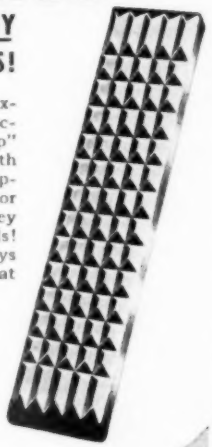
Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

ONLY DEMCO

GIVES YOU SO MANY TONG DIE FEATURES!

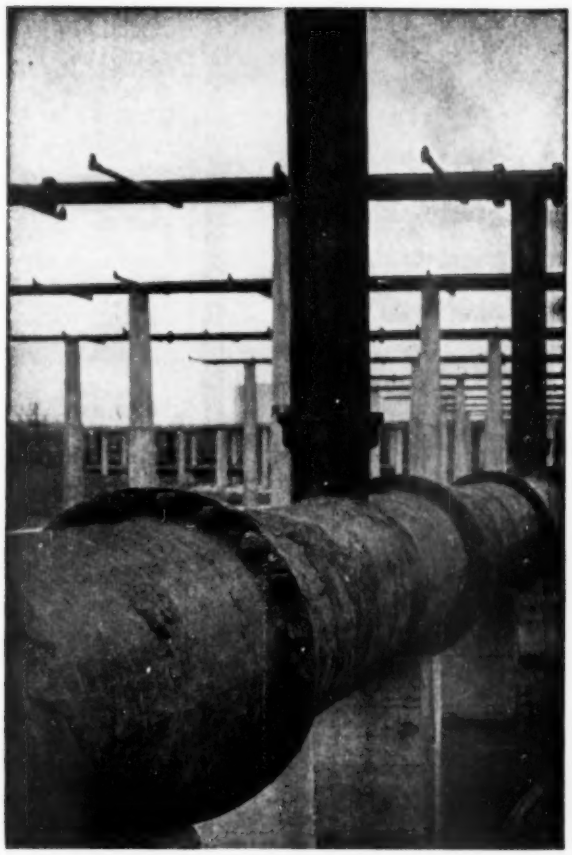
Check them all! Demco's exclusive, original patented process provides SAFE "No Chip" Soft Ends! Uniform, full length hardness assures *long life* gripping surfaces! Reversible for convenient installation, they require no special driving tools! For *long run* economy, always ask for DEMCO tong dies at your supply store!



Go DEMCO — it pays!

DRILLING EQUIPMENT MFG. CO. DEMCO OKLAHOMA CITY, OKLA. U.S.A.

DEMCO PRODUCTS AVAILABLE AT LOCAL SUPPLY STORES — EXPORT: 233 BROADWAY, N.Y.C.

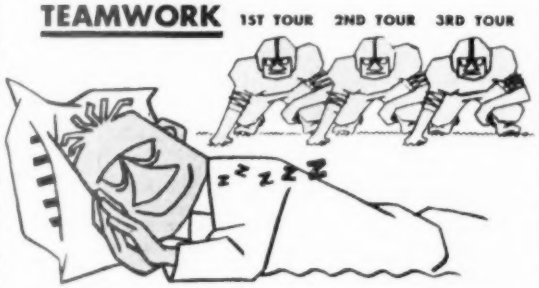


AN ECONOMY FACTOR IN REFINERY OPERATION

Proved long life and stubborn resistance to corrosion make cast iron pipe a contributing factor in lowering plant maintenance per barrel of crude. Replacing shorter-lived pipe with cast iron pipe has demonstrated this in many refineries. Cost per term of service decreases. Interference with production, caused by frequent replacements, ceases to be a headache. Cast iron pipe works hand-in-glove with plant management to keep maintenance cost down in many refinery operations. Available with bell-and-spigot, plain end and flanged, or with standardized mechanical joints. Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, 1015 Peoples Gas Bldg., Chicago 3, Illinois.

CAST IRON PIPE
FOR LONG LIFE AND ECONOMY

DON'T JUST DREAM ABOUT TEAMWORK

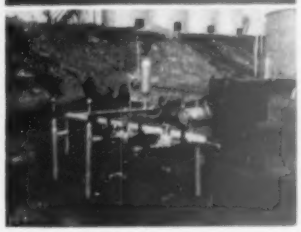


Give your crews the advantages of Geograph's complete record of drilling operations . . . then watch 'em go for touchdowns! Geograph just naturally inspires the kind of teamwork that gives you the most hole *at the least cost per foot!*

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

Farmington, New Mex. • Liberal, Kan. • Oklahoma City, Okla. • Bakersfield, Cal. Abilene, Houston, Odessa, Lubbock and Wichita Falls, Tex. • Shreveport, and Baton Rouge, La. • Casper, Wyo. • Glendive, Mont. • Sterling, Colo. • Calgary and Edmonton, Alberta, Canada • Regina, Saskatchewan, Canada

SECONDARY
MODERN
RECOVERY
TECHNICAL CONSULTING
PRODUCTION ENGINEERING
SERVICE INCLUDING
CORE ANALYSIS
PRESSURE MAINTENANCE WITH GAS OR WATER
REPRESSURING WITH GAS OR WATER
Water Flooding
Equipment
Shallow Lease


Shackelford County,
Texas
SURVEYS
ESTIMATES
DESIGN
INSTALLATION
SUPERVISION
PETROLEUM ENGINEERS
CABLE ENGINEERING
WICHITA FALLS, TEXAS

INFERNO
Gauge Cocks

Have Many Advantages:
- Reversible Seat
- Double Life
- Scientific Balance
- Durable Seating Disc
- Available in 3 Metals
- Renewable Nozzle Tip
- Safety Feature
- Will Not Leak

Write for Bulletin 18-C.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.
INFERNO

TEXAS

EAST TEXAS

Field Extension Completed In Navarro County

Olsan Brothers, Inc. 2 P. T. Fullwood, south extension to South Kerens field, has completed for 136 bbl. of 35°-oil a day. The gage was through 12/64-in. choke on perforations in the Woodbine at 3,401-04 ft. Top of pay was 3,410 ft.

Previous to the completion test, the well gaged 218 bbl. of oil in 20 hours through 16/64-in. choke. Location is on a 168-acre lease in the Iredell Redding Survey, A-677.

Neches Confirmation Running Low

Byrd Oil Corp. 1 R. L. Springer, first confirmation attempt to the new Neches-Woodbine field north of Neches in Anderson County, was reported running about 45 ft. low to Humble Oil & Refining Co. 1 Northeast Neches Oil Unit, field discovery. Operators were coring at 4,640 ft. and looking for the Woodbine. Woodbine top in Humble's discovery was 4,697 ft.

Casing Set in Collin County Wildcat

Humble Oil & Refining Co. 1 Henry Miller, deep wildcat 3½ miles west of McKinney, ran 7-in. casing to 9,420 ft., which has increased interest of observers. Geological data has not been released and operators said no plans for testing had been made. Original contract depth on the well was 10,500 ft. At this time there is no production in Collin County.

WEST TEXAS

Prichard - Devonian Pool Gains Ellenburger Producer

A new pay, in the Ellenburger, has been added to Prichard-Devonian field in northeast Andrews County.

Anderson-Prichard Oil Corp. 1-I University, on the south side of the pool and an extension well, kicked off after acid treatment of open-hole between 13,475-487 ft. and flowed 295 bbl. of oil in 10 hours. Final hour of the test, through ¼-in. choke, tanked 28.42 bbl. under flowing pressure of 400 psi. Out of the total oil tanked, 67 bbl. was load oil and the balance was new oil. Operators were building storage for completion tests.

Anderson-Prichard 1-E University, Devonian discovery of the pool, ran a little high on the Ellenburger to 1-I University, but had water in that formation. Datum tops on the Ellenburger were 10,476 ft. in the 1-E discovery, compared with 10,497 ft. in 1-I University.

Upton County . . . A pre-Permian strike for the northwest side of this county was in the making at Gulf Oil Corp. 1-AE TXL, in SW SW 31-42-T5S-T&P. A 4-hour drill-stem test between 9,170-9,220 ft., not identified but thought to be Pennsylvanian, produced a heavy flow of gas in 3 minutes and had flowing oil in 12 minutes. It was cleaned into pits for 18 minutes, then turned into tanks for a 3-hour gage of 204 bbl. of 43° oil. Gas-oil ratio was 2,190 cu. ft. and flowing pressure ranged from 1,170-1,685 psi. Oil in the pipe was reversed out, which had no formation water, and coring started.

Location is 5 miles north of new deep pay in Adamc field, opened by Gulf on the McElroy Ranch, and 6 miles northeast of Crane.

On the northeast side of the Adamc field, Gulf 3 McElroy Ranch-State, Fusselman pay discovery for the area, prepared to deepen after testing mud with no shows from 11,699-11,770 ft., in the Ellenburger.

This well had top of the Fusselman at 10,507 ft., minus 7,904 ft., and had flowing oil on a drill-stem test between 10,515-10,650 ft. Oil reached the top in 17 minutes and the gage was 240 bbl. of clean oil with no water in 3 hours. Second test from 10,648-10,674 ft. flowed 618 bbl. of oil with no water in 6 hours. Gravity of the oil was around 52°.

North Andrews Discovery Completed

L. M. Glasco & Roden, et al 1 L. L. Butler, 17 miles northeast of Andrews in 14-A19-PSL Survey, completed as a Devonian discovery for a calculated potential of 1,973 bbl. of oil a day. The final gage was based on a flow of 458 bbl. of oil in 5 hours and 34 minutes. Tubing pressure of 50 psi. indicated it was through open tubing.

The discovery had top of the Devonian at 12,543 ft. on elevation of 3,022 ft., and was bottomed at 12,563 ft.

Triple N Field Extension

Gulf Oil Corp. extended Ellenburger production to the south at its 2-AQ State in SW NE of Section 29. Top of pay was 12,438 ft. on ground elevation of 3,178 ft. Completion potential, without acid, was 711 bbl. of oil a day through 11/64-in. choke from perforations between 12,445-12,495 ft.

SOUTHWEST TEXAS

New Deep Frio Production Indicated at White Point

More than 200 ft. of oil saturation has been found in a lower Frio sand section encountered by Republic Natural Gas Co. at its 55 Rachal, a deep test it is drilling in the White Point field, located on the north shore of Nueces Bay, in San Patricio County, opposite Corpus Christi. Four drill-stem tests in the sand indicated commercial oil production, which, if obtained, will be the first from this horizon in either this, or its neighboring East White Point field.

Top of the sand section was logged at 8,288 ft. with the base at 8,502 ft. Drill-stem tests were made of intervals at 8,304-10 ft., 8,312-27 ft., 8,366-89 ft., and 8,412-62 ft. Recoveries ranged from 1,000 to 2,500 ft. of oil with no evidence of water. Gravity of the oil was 39°. An electric log run from 8,457 ft. gave indications of at least three additional productive horizons in the depth range from 7,450 to 8,300 ft.

For the time being, the showings are being passed up with operators expecting to carry the hole to its original objective of approximately 9,500 ft.

Although this may prove to be the first oil production in the deep lower Frio horizon for these fields, there already is gas-distillate production, discovered in 1950. The latter production, at depths of 8,500 to 9,300 ft., is located in Nueces Bay, about 2 miles to the southwest of the present well.

Development in the White Point area dates from 1938. Approximately 375 wells have been drilled, of which 275 currently are producing. Main production is from sands above

6,500 ft. Cumulative production totals more than 46,000,000 bbl.

Republic owns 1,281 acres productive of oil and 200 acres productive of gas.

TEXAS GULF COAST

Deep Distillate Reserve Uncovered at Alta Loma

What appears to be another important gas-distillate reserve has been opened by Phillips Petroleum Co. in the Alta Loma area of western Galveston County. The discovery well, 1 Hulen, producing from a deep Frio sand, open through casing perforations at 14,549-81 ft., flowed at the rate of 407 bbl. of distillate with 2,500,000 cu. ft. of gas per day on tests through 3/16-in. choke.

Previous production in the area, opened in 1940, has been from sands above 10,000 ft. The Phillips well, drilled to a total depth of 15,010 ft., also is the area's deepest test. Location is about 4 miles south of the Alto Loma townsite. Phillips holds a 3,600-acre block around the deep discovery. Location also is approximately 5 miles east of the prolific and widespread Chocolate Bayou field, in Brazoria County, where Phillips also has large oil and gas holdings.

CALIFORNIA

Good Discovery Recorded in Southeast Coalinga Area

A new field discovery was registered by Lloyd A. Harnish, Opr. 73 "Well" in the Pleasant Valley area, near Coalinga, in Fresno County. The well is producing 900 bbl. daily through 24/64-in. choke, and a northwest offset was started at Russell Giffen 62-32F. Production was from the interval 8,351-8,410 ft., possibly in the Vaqueros formation of lower Miocene age.

Located in SE NE 32-20s-16e, the successful test is about 1 mile south of Pleasant Valley production and about 1¾ miles west of the Guijarral Hills field. A dry hole was drilled between Pleasant Valley and the discovery but none west of Guijarral Hills. Main pay at the latter is the Leda sand, at depths of 8,000 to 8,300 ft. The operator was preparing to drill a southwest offset in SW NE Section 32. Standard Oil Co. of California has a lease on Section 33.

Yolo County Gas Discovery

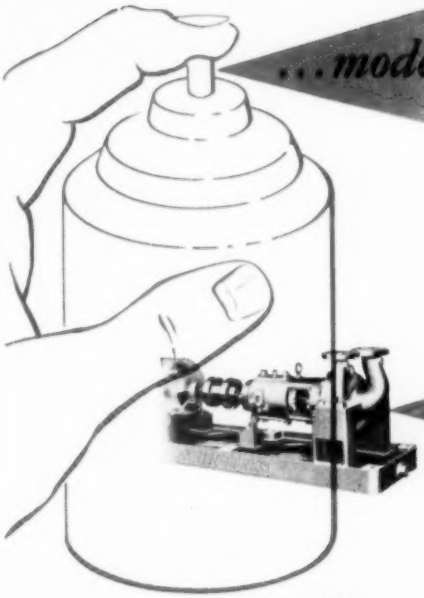
Signal Oil & Gas Co., jointly with Monterey Oil Co., has recorded a new field discovery 7 miles northeast of the Dunnigan Hills field in Yolo County. On a short test, 1 Signal-Monterey-Reclamation flowed gas at a daily rate of approximately 4,100 M.c.f. from the Capay sand (Eocene) at a redrilled depth of 3,744 ft. Following the test the wildcat was shut in pending completion of pipe-line outlet. The test is located in SE NW 20-12n-1w, on a block of 8,400 acres jointly held by the two companies.

Pipe Set in Reserve Test

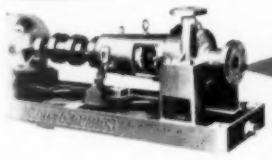
Reserve Oil & Gas Co. bottomed its Pyramid Hills wildcat at 5,237 ft. and set 5½-in. casing at 4,565 ft., indicating the test may have found worthwhile oil shows in the third Kreyenhagen sand. A formation test in the second Kreyenhagen at 4,008-73 ft. revealed the wildcat might make a commercial gas condensate discovery. The wildcat, 48-20

Pacific Process Pumps

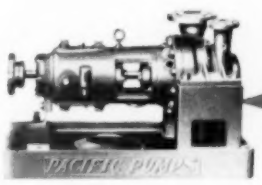
...modern fly swatters!



SVC TOP SUCTION, TOP DISCHARGE, SINGLE STAGE



SEC END SUCTION, TOP DISCHARGE, SINGLE STAGE



RVC TOP SUCTION, TOP DISCHARGE, TWO STAGE

★ Custom fabricated from properly chosen materials to perform their tough jobs, Pacific process pumps give a mighty assist in the production of insect sprays, detergents, antiseptics and a host of other products that safeguard health and give comfort to mankind . . . thus in a sense becoming "modern fly swatters." The widespread use of Pacific process pumps for heavy-duty assignments in the petro-chemical industry is conclusive proof of Pacific's ability to perform continuous service with sustained economy.

Pacific single-stage Types SVC and SEC handle liquids from sub-zero to 800°F., 15 to 1,600 gpm, 500 to 600 psig, discharge pressure, differential heads up to 600 feet, speeds to 4,000 rpm. Two-stage Type RVC pumps liquids from sub-zero to 850°F., 50 to 600 gpm, discharge pressure to 600 psig, differential heads to 825 feet, speeds to 3,600 rpm. For further details, write for Bulletins 101 and 108.

PACIFIC Precision Built PUMPS

Pacific Pumps inc.

ONE OF THE DRESSER INDUSTRIES

HUNTINGTON PARK, CALIFORNIA

Export Office: Chanin Bldg., 122 E. 42nd St., New York

Offices in All Principal Cities

Orchard, is located in SE SW 20-24s-18e, or about ¾ mile south of Pyramid Hills production. Its encouraging shows have resulted in a new flurry of leasing near the Kings-Kern county line.

Shell Stakes Solano Outposts

Shell Oil Co. has staked ½-mile north and south outposts to its recent gas discovery 3 miles north of the Kirby Hills field in Solano County. Its 1 Unit-A will be drilled in SW SW 6-4n-1e and 1 Unit-C in NW SW Sec. 7. Shell 1 Unit-B was completed in July flowing 5,000 M.c.f. daily from the Domengine sand (Eocene) at 3,515-55 ft.

Lost Hills Discovery Abandoned

The discovery well of Carneros oil production in the Lost Hills field, Kern County, has been abandoned. As a new zone discovery, Standard Oil Co. of California 16 "Well" last July pumped 177 bbl. daily of 32° gravity crude. Production from the 6,050-ft. pay dropped off rapidly, however, causing its early abandonment.

ROCKY MOUNTAIN

WYOMING

Campbell County Discovery Indicated

Trigood Oil Co. of Casper has confirmed reports of shows at 2 Units, C SW NE 33-53n-70w in the Mitchell Creek area of Campbell County. Earlier reports of a possible discovery in the area were denied by the operator.

Information currently released by Trigood includes results of two drill-stem tests which justify running of casing for further testing of Minnelusa (Pennsylvanian). Test from 7,642-66 ft. recovered 2,800 ft. of undifferentiated oil and water, ranging from 5 to 40 per cent oil. Another test from 7,635-51 ft. recovered 1,100 ft. or 27°-gravity oil and 400 ft. of 50 per cent oil-cut mud. No times or pressures were reported on either test. Both tests were confirmed as in the Minnelusa. With present depth below 8,160 ft., the operator expects base of Minnelusa at about 8,500 ft. After drilling through the formation the operator will set casing for attempted completion in the zone already tested if no further shows are found. Marginal Pennsylvanian production was found in one well in the Adon area of this county in 1948. Later drilling was not encouraging and there is no longer production from the Adon area.

Natrona County Wildcat May be Phosphoria Discovery

Superior Oil Co. has neither confirmed or denied reports of a discovery at 36-14 Government, SW NE SW 14-37n-85w in the Okie Draw area of Natrona County. Reports are given credence in the area, however. Indications are that the operator is coring below 2,810 ft. after recovery of 2,330 ft. of oil on test of the Phosphoria which was topped in samples at about 2,745 ft.

The wildcat is 1¾ miles southeast of Notches field where production is from Tensleep at about 2,800 ft. There has been no previous Phosphoria production in the area.

Cole Creek Deepening Planned

Socony-Vacuum Oil Co.'s Pegasus Division is preparing to deepen 42-21-G, SE NE NW 21-35n-77w in Cole Creek field, Natrona County. The well was completed as a producer in both Dakota and Lakota, and will now be deepened to Tensleep at about 9,500 ft. It is now producing about 30 bbl. of oil daily from Dakota. Lakota production was discontinued some time ago, due to heavy recovery of water. There has been no previous test to formations as old as Pennsylvanian in the area.

COLORADO

Roggen Area Wildcat Produces From "D" Sand

Leo Spears and Colorado-Wyoming Oil Co. recovered oil on drill-stem test of "D" sand at 1 Zimbleman, C SE NE 22-2n-63w, in the Roggen area of Weld County. Test of the interval 7,035-55 ft. flowed oil at an unannounced rate, and recovery in pipe was approximately 7,000 ft. of oil. Details have not been released, and the sand was not cored, but the operator has reported an estimated 18 ft. of saturation. The well is about 1½ miles southwest of Twin Oil Corp.'s discovery at 2 Cuykendall NW NW SW 12-2n-63w, which was completed early this year for a pump gage of 288 bbl. per day from "J" sand. Previous drilling through the area showed no substantial indication of production in "D" sand. Following test of the "D" sand, cores of the "J" were not encouraging, and completion will be attempted in the upper formation.

Black Hollow Confirmation Pumps Oil

The California Co. completed 1 UPRR, NE SW SW 31-8n-66w, confirmation well in Black Hollow Permian pool, Weld County for a pump gage 320 bbl. of oil per day. The well produced from open hole in Lyons sand at total depth, 8,958 ft., with the well still in Lyons at that depth. There has been no attempt to drill through the formation in this area to date. First Permian production in the Denver-Julesburg basin was found in Keota field, and the recovery went heavily to water when the well was put on production. The earlier discovery drilled ahead to deeper zones after finding Lyons production.

MONTANA

East Poplar Extension Flows at High Rate

Empire State Oil Co. reported a recovery of 180 bbl. of oil per hour on test of two Madison zones at 3 Cornejo, C NE SW 8-29n-51e, north of East Poplar field, Roosevelt County. The well is an extension of this operator's recent discovery in the area which was reported as a 6,000-bbl. per day producer. The second well in the area had good shows but produced water on tests, and was abandoned.

Test was run of 3 Cornejo from 5,906-14 ft. in the B-1 zone and from 5,824-29 and 5,832-38 in the B-2 zone. Tests followed light acidization of both zones. The B-1 zone produced 98 bbl. of oil on a 1-hour test, and the 180-bbl. per hour flow was a combined flow from both perforated intervals.

At a west offset to the new Empire Oil

Assure power for MICROWAVE systems
with ONAN Standby
ELECTRIC PLANTS
WHEN STORMS, floods or breakdowns cut off central station power, dependable Onan Standby Units keep repeater stations functioning.
Automatic line transfer controls start and stop plant. Units require a minimum of attention; will run continuously if necessary. Proved dependable in hundreds of installations serving utilities, pipelines, railroads, TV networks, and police.
A size and model for every standby use
Air-cooled: 1,000 to 10,000 watts. One- and two-cylinder models. Water-cooled: 10,000 to 50,000 watts. Powered by four- and six-cylinder industrial engines.
WRITE our sales engineering department for complete specifications.
D. W. ONAN & SONS INC.
7957 University Ave., S. E. Minneapolis 14, Minn.
Onan
PRODUCTS

These Notes are not being offered to the public.

$18,400,000

Yellowstone Pipe Line Company

3⅞% Secured Notes due October 1, 1978

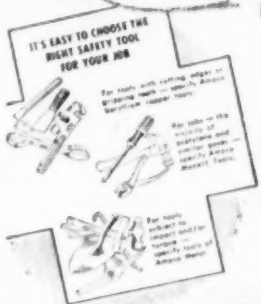
The Company through the undersigned has entered into agreements with certain institutions under which $9,200,000 principal amount of the Notes have been delivered. Subject to the terms of the agreements the Company has the option of delivering up to a maximum of an additional $9,200,000 principal amount of Notes on or before December 15, 1954.

MORGAN STANLEY & CO.

October 15, 1953.

Let Doctor "E" Solve YOUR Lubrication Problems Too . . .
with
Electrofilm
DRY FILM LUBRICATION
AIRCRAFT
TRANSPORTATION MAINT.
BUSINESS MACHINES
MACHINERY MAINT.
SPORTING GOODS
PIPE LINES
DIESEL ENGINES
AUTOMOTIVE MAINT.
1001 INDUSTRIES
RECOMMENDED
. . . where ordinary lubrication is not adequate due to extremely high or low temperature, solvents, inaccessibility, dirt, pressure, etc.
FACILITIES IN PRINCIPAL CITIES
SAVE MONEY . . . Write for Doctor E's FREE Bulletin of case histories and technical data
Electrofilm, Inc. Dept. E, P. O. Box 106, North Hollywood, Calif.

Don't Spark a Disaster in Your Plant
Use *Ampco* Safety Tools
in hazardous locations



Why take chances with ordinary tools in hazardous locations — chances that can leave your property a smouldering ruin in a few minutes? Why risk the ever-present danger of fire when the right Ampco Safety Tool can prevent expensive property damage—save lives?

Ampco Safety Tools are approved and recommended by Factory Mutual Laboratories and other leading safety authorities for use in hazardous locations. These tools provide low-cost protection wherever there is danger of fire or explosion.

Choose your safety tools from the more than 400 types and sizes that make up the Ampco line. There's one for practically every job in your plant. Order Ampco today! Get the benefit of lower insurance rates and improved worker morale.

AMPCO

AMPCO METAL, INC.
Dept. OG-11
Milwaukee 46, Wisconsin

WEST OF THE ROCKIES, IT'S AMPCO BURBANK PLANT, BURBANK, CALIFORNIA • IN CANADA — SAFETY SUPPLY CO., TORONTO, ONTARIO

producer, C. H. Murphy Corp. recovered 2,465 ft. of oil, 1,080 ft. of mud and 20 ft. of salt water on test of 30 Unit, C SE SW 8-27n-51e. This recovery was in the B-1 zone. Tests of the lower B-2 zone recovered on gas, and oil and gas cut mud. The operator is running casing.

Brorson Confirmation Starting

Sun Oil Co. and Phillips Petroleum Co. are moving in materials for a second well in the Brorson area of Richland County. The well is 2 Dynneson, C SW SW 29-29n-58e, ½ mile north of the discovery well which produced 745 bbl. of oil per day through 20/64-in. choke. Production is from Ordovician at 12,585-605 ft. The discovery is rated one of the most important in the entire Williston basin since it was the first to be made in the deeper portion of the basin away from surface structures and on geophysical data.

Chouteau County Wildcat At Critical Depth

Milton Spencer has set casing on top of Sawtooth at 1 Carpenter, NE NE SW 22-27n-7e, Chouteau County, and will drill into the formation with cable tools. The well is the first four currently active locations in this county. A core drilling program through the area several months ago recovered saturation from Sawtooth according to reports still unconfirmed. Delay in further exploration has been due to uncertain status of state leases following an adverse ruling on a recent lease law passed by the state legislature. Continental Oil Co. which conducted the core program in the county has made location for 1 Lenington, SW NW NW 24-27n-7e, the fourth for this township.

NEBRASKA

Kimball County Pool Opener Completed

Mid-Continent Petroleum Corp. has completed 1 Chaney, NE NE NE 27-13n-57w, Kimball County. The well, which has been testing for some time settled to a pump potential of 75 bbl. of oil daily. It is the first well drilled by Mid-Continent as sole operator in the current Rocky Mountain exploratory program.

NORTH DAKOTA

Southeast Stepout Located at Fryburg

Amerada Petroleum Corp. has made location for a stepout southeast of the discovery in the Fryburg area of Billings County. The new well is 1 Franchuk, C NW SW 10-139n-100w, about ¾ mile southeast of production at the Fryburg discovery. The company recently completed 1 Logan, C SE SW 4-139n-100w northwest of the discovery for a flow of 225 bbl. of oil and 89 of water per day through 24/64-in. choke.

APPALACHIAN AREA

WEST VIRGINIA

In Union district, Preston County, West Virginia, a rank wildcat test is drilling by Columbian Carbon Co. 1-1196 Robert Breedlove et al, elevation 2,546 ft., Oakland Quadrangle, 4.37 miles south of latitude 39 degrees 30 minutes and 4.32 miles west of longitude 79 degrees 25 minutes. The depth is now 1,560 ft. Glade district, Webster County, Nelson W. Taylor et al, located 1 H. E. and Clara Arbogast, elevation 2,224 ft., Cowen Quadrangle, 5.66 miles south of latitude 38 degrees 30 minutes and 3.18 miles west of longitude 80 degrees 30 minutes. Gregory Gas Co., announced completion of 1 C. D. Howard heirs, at 2,929,000 cu. ft. gas in the Maxon sand. Middle Fork district, Randolph County, Nollem Oil & Gas Corp., Agt., located another 1 Moore Keppel Co., elevation 2,278 ft., .08 mile south of latitude 38 degrees 50 minutes and 3.50 miles west of longitude 80 degrees 00 minutes.

PENNSYLVANIA

A significant increase in wildcat activity in Pennsylvania is noted as the development of the Benezette Oriskany sandstone gas field continues at a rapid rate.

Delta Drilling Co.'s 1 Ambrose Ging is drilling at 500 ft. Test is located in Lycoming County, in Section B, Warrensville Quad., 4,600 ft. from south line and 7,200 ft. from west line.

In Potter County J. H. Isherwood's 1 Van Sickle is drilling at 2,300 ft. Location is in Section D, Gaines Quad., 3,200 ft. from north line and 11,900 ft. from east line.

Godfrey L. Cabot has cleared a location on 1 Solomon in Union County in Section D, Sunbury Quad., 6,500 ft. from north line and 7,700 ft. from west line.

C. E. Fralich et al have made a location, 1 Chas. Lisowity, in Indiana County, Section D, Barnesboro Quad., 12,000 ft. from east line and 1,250 ft. from south line.

In Broadtop Township, Bedford County, Benedum and Trees have moved a rotary on 1 Broadtop Coal Co. Drilling operations should start soon. Hole was topped by a cable tool rig.

OHIO

B. H. Putnam et al. tested the Clinton sand at 5,493-5,565 ft., and the Medina sand at 5,614-5,631 ft. in the 2 Melvin Ice, Section 2, Troy Township, Athens County, and found both unproductive. The hole was then plugged back to 4,120 ft. to test a showing of gas in the Oriskany sand, found at 4,092-4,120 ft. The sand was fractured and a gage of 750,000 cu. ft. was taken at 72 hours after treatment.

Two Clinton sand wildcats are now drilling in Carroll County, Status Development Co. 1 Stotzer, Section 31, Rose Township, and Natural Gas West Va. 1 Ebner, Section 18, Brown Township.

MISSISSIPPI

Knox Dolomite Discovery Makes Pumping Producer

Magnolia Petroleum Co.'s Knox dolomite discovery well in western Monroe County, in the northeastern Mississippi sector of the Black Warrior basin, has been placed back on production by pumping. The well, 1-A Snow, located near the C NW NE 27-13s-7e, approximately 7 miles north and a little west of Aberdeen, made 224 bbl. of net oil, plus approximately 25 bbl. of water in the first 24 hours on the pump. At latest report it still was making a little above 200 bbl. of oil per day with about the same amount of water.

Brought in early in September with pay open through casing perforations at 4,753-56 ft., the well flowed initially at the rate of more than 29 bbl. of 35°-gravity oil per hour. Production dropped rapidly, settling around 40 bbl. per day for several weeks, and finally died. The well, now on the pump, is being called completed, with the discovery being designated as New Hope field.

In the meantime, another Knox test, L. E. Salmon 1 Patterson, in 21-11s-1e, in the southwestern corner of Pontotoc County, about 45 miles northwest of the Magnolia discovery, is reported to have encountered promising gas showings in the top of the Ordovician, logged by samples at 5,270 ft. In a 3½-hour drill-stem test of an interval at 5,268-5,327 ft., the well had gas at the surface in 67 minutes and burned a small flare. Recovery was 60 ft. of gas-cut mud. Hole is being deepened to its Knox dolomite objective.

Carter Oil Co.'s Knox dolomite test in the new Trebloc field, southeastern Chickasaw County, approximately 20 miles southwest of Magnolia's discovery, has been plugged back to and is testing the Mississippian section. It was drilled to 7,026 ft. in the Knox, topped at 6,505 ft., without important showings being encountered in that zone. Casing now is perforated at 5,069-76 ft., where tests so far have proved unsuccessful. The well is the second test for the new field. The discovery well is a gas-condensate producer in the Mississippian-Carter zone at 4,300-60 ft.

Carter is starting another Knox dolomite test in Calhoun County. This test, 1 Crane, located in the SW NE SW 31-13s-1e, 3½ miles northeast of Vardaman, is approximately 50 miles west of the Magnolia discovery.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: Lapo Oil Co. 1 Castro, Jose Antonio Gutierrez Sur. 1059, A-281, Dry. TD 2,112 ft.

Pagenkopf & Northrup 1 Simmons, C. F. Simmons Subd., Sec. 1. Dry. TD 2,200 ft.

Texita Oil Co. 1 Ortiz, Blk. 54, Natascosa Farm Colony Subd., A-641. Dry. TD 1,915 ft.

Duval County: Jack Little, trustee, 1 Dunn, Blk. 380, Diego Ynojosa Grant, A-629. Dry. TD 4,100 ft.

Pontiac Refining Corp. and A. O. Morgan 1 Marshall Brothers, Sec. 59, Addition 4, Copita Farm & Garden Tracts. Dry. TD 5,289 ft.

Gonzales County: Moody Monroe 1 Lamkin, A. W. McCamley Sur., A-344. Dry. TD 4,522 ft.

Sutton Drilling Co. 1 Robinson, James Gibson Sur. Dry. TD 2,600 ft.

Hays County: Armon E. Mabry 1 Combs, Cyrus Wickson Sur. Dry. TD 730 ft.

Hidalgo County: Jake L. Hamon 1-D Drawe, Lot 1, Sec. 39, Capisallo District Subd. Dry. TD 8,150 ft.

Jim Hogg County: Chizum, Rhodes & Hicks 2 Ed Isaguirre, Jr., Agua Nueva de Abajo Sur., A-258. Dry. TD 4,310 ft.

Clymore & Whitehurst 1 Guerra-San Ramon Ranch, Share H-14-A, Las Cuevitas Grant. Dry. TD 2,820 ft.

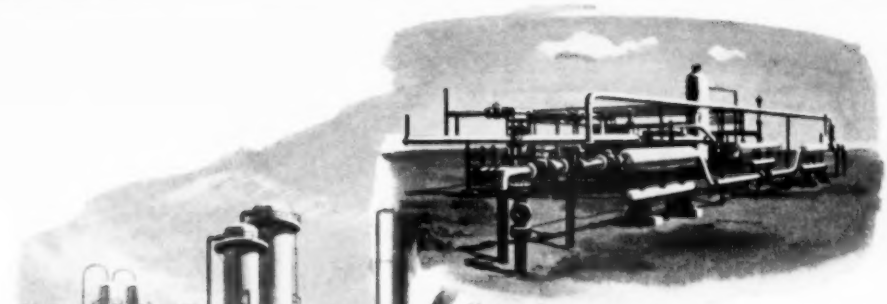
George H. Coates 1 Silver Lake Ranches, Inc., Share 1, Las Vivoritas Grant, A-226. Dry. TD 5,153 ft.

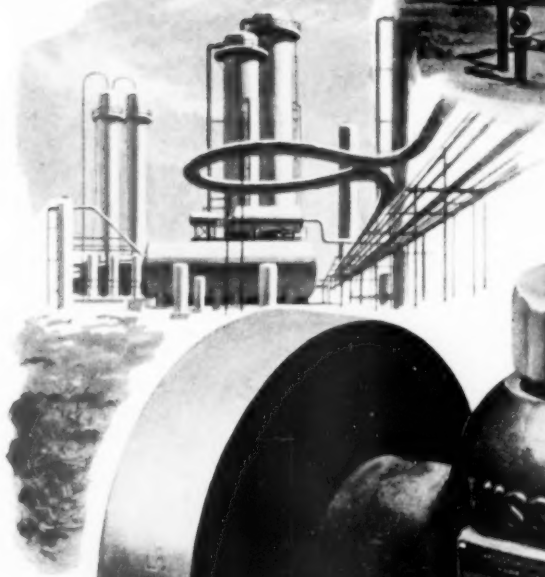
J. W. Gorman 1 Marrs McLean trust, Las Animas Alberca de Abajo Grant. Dry. TD 3,110 ft.

Kinney County: Austral Oil Exploration, Inc., 1 Wardlow-Whitehead estate, Meliton Valdez Grant. Dry. TD 4,373 ft.

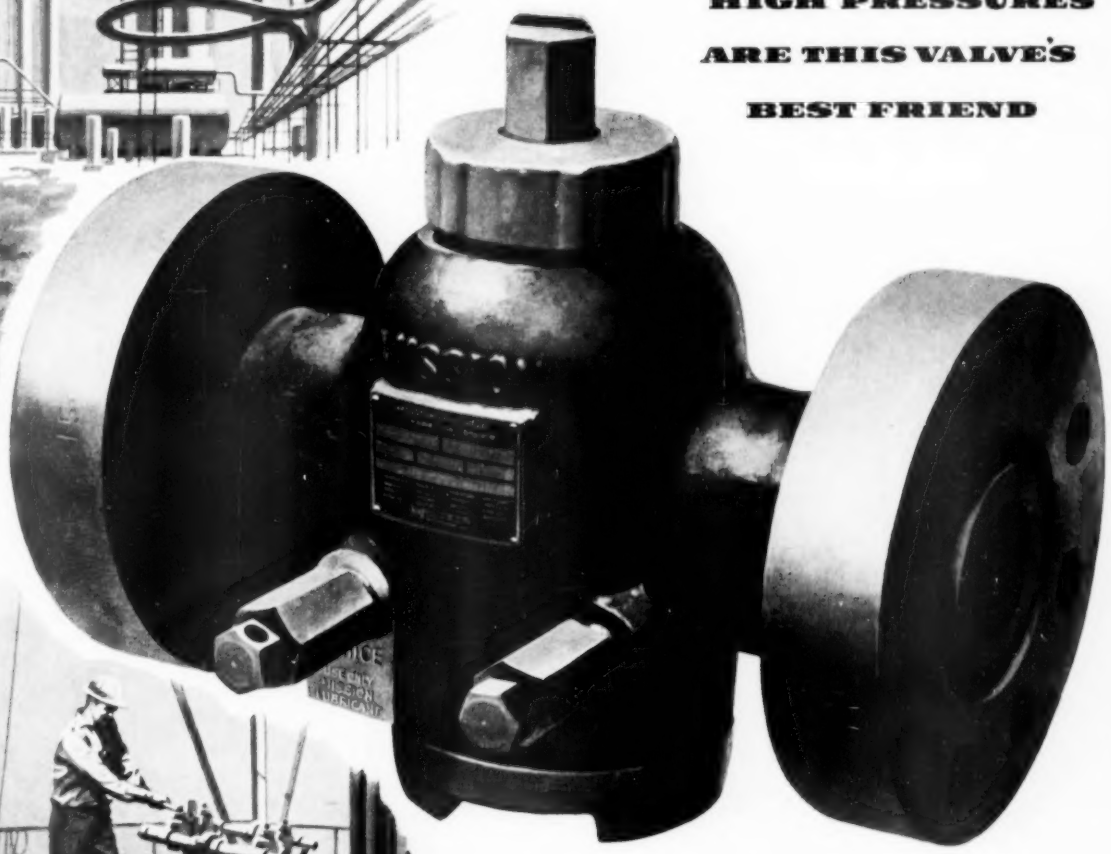
Kleberg County: Heep Oil Corp. 1 Reitsch, Lot 14, T. F. Koch Lands. Dry. TD 7,510 ft.

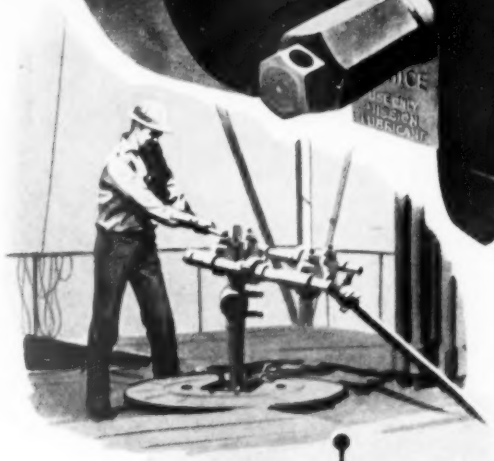
McMullen County: Jake L. Hamon 2 Baker

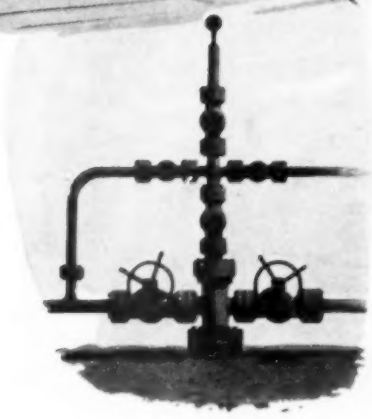




HIGH PRESSURES ARE THIS VALVE'S BEST FRIEND







. . . because Mission Plug Valves let line pressure work to make a better seal. The Mission line pressure lubrication sealing system responds instantly to any pressure, liquid or gas.

Line pressure automatically forces lubricant from lubricant reservoirs to sealing grooves. Both ports are encircled by full-port lubricant grooves. Dual lubricant guns, permit simplified selective lubrication. When lubricating a Mission Plug Valve, a portion of the lubricant is forced into the reservoirs. Line pressure automatically feeds this stored lubricant, as needed, into the downstream seal grooves. As long as lubricant remains in the reservoirs, a perfect seal is assured in high or low pressure . . . gas or liquid . . . regardless of which end of the valve may be downstream, thus assuring a perfect seal, easy operation.

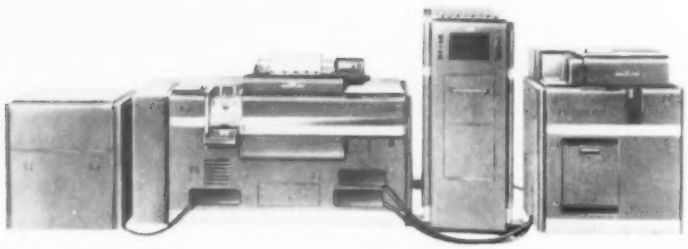
Specify Mission Automatic Lubricated Plug Valves for your next field or plant installation.

MISSION MANUFACTURING CO.

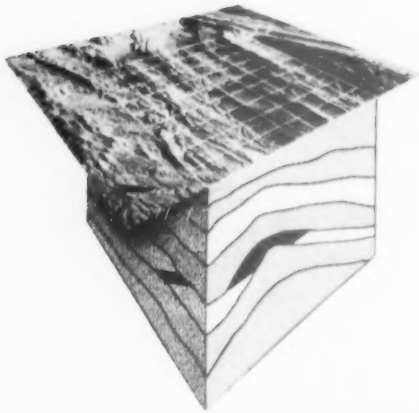
P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York

IBM Electronics...



Speeds the Search for Oil



Aided by the latest IBM equipment, petroleum scientists are able to reduce magnetic and gravitational survey data to interpretive form in a fraction of the time required before.

In this way, high-speed IBM Electronic Computers are helping several companies to find the most favorable locations for drilling.

The same machines, which make an easily-handled operation of a problem involving millions of computations, can also be used in many phases of research, engineering and accounting work. Why not talk to IBM about the various ways these machines can help *your* company?

IBM
TRADE MARK

INTERNATIONAL BUSINESS MACHINES • 590 MADISON AVENUE, NEW YORK 22, N.Y.

WILDCAT COMPLETIONS

estate, M. F. Lowe Sur. 16. Dry. TD 7,420 ft.

Milam County: Martin Seeyman 1 Williams, Jose Leal Sur. IPP 12 BOPD, Minerva sand 1,383-89 ft. (casing perforations). TD 1,393 ft.

Nueces County: Monterey Exploration Co. 1 Levy, Share 9, Bluntzer Partition, de la Garza Montemayor Grant. Dry. TD 6,313 ft.

H. H. McFarland 1 Johnson, Share F, Bluntzer Partition. Dry. TD 6,325 ft.

Rand Morgan 1-B Fee, A & BM Sur. 415 (West Saxet area). Dry. TD 6,315 ft.

Panhandle Oil Corp. 1 Hill, E. R. Oliver Sur. 162, A-958. Dry. TD 6,676 ft.

San Patricio County: H. R. Smith 1 S. L. Webb, Jr., Tract 27, Drummond Subd. IP 94,000 M.c.f. daily (estimated) with 10.1 BC per M.M.c.f., open flow, casing perforations 5,707-12 ft. TD 10,014 ft. (Extends East White Point field.)

Plymouth Oil Co. 1-J Welder, Share 1, Welder Ranch Subd. (North Pasture area). Dry. TD 8,510 ft.

Starr County: Clark Fuel Producing Co. 2 Zarsky, Share 47, Porcion 82. Dry. TD 1,706 ft.

Webb County: Don H. Marsh 1 A. M. Bruni est., J. Poitevent Sur. 471. Dry. TD 999 ft.

Williamson County: John Kubicek et al 1 Fee, P. J. Mahan Sur. Dry. TD 840 ft.

Wilson County: O. W. Killam and M. L. Wise 1 Bryan, J. M. Arocha Sur. 341, A-25. Dry. TD 7,710 ft.

Zapata County: Orlee Oil Co. and Ed W. Dawson 1 Revino, Sur. 290. Dry. TD 2,310 ft.

The Texas Co. 1 Martin NCT 2, El Ranchito Pasture, Jose Vasquez Borrego Grant, A-209 (El Ranchito area). Dry. TD 4,150 ft.

Zavala County: Joe R. Wier 1 Denman & Lackey, Section 142, Cross S Ranch, Niaguire Sur. Shut down. TD 8,164 ft.

TEXAS GULF COAST

Bee County: F. B. Cochran, Jr., et al 1 Schramm-Mosheim, Hugh O'Brien Sur. 447. Dry. TD 5,200 ft.

James G. McCarrick 1 Chesnut et al, M. de los Santos Sur., A-64. Dry. TD 5,512 ft.

Brazoria County: Greenbriar Oil Co. 1 McCarthy, Samuel Carter Sur., A-53. IP 3,876 M.c.f. daily and 43 BCPD, 16/64-in., 48°, casing perforations 10,744-66 ft. TD 11,180 ft. (New pay in Bailey's Prairie field.)

Burleson County: Thomas J. Haberle 1 Alexander, George Chance Sur. Dry. TD 3,000 ft.

Chambers County: Humble Oil & Refining Co. 2 Union National Bank of Houston, James Lawrence Sur., A-168. Dry. TD 11,000 ft.

Fayette County: Sutton Drilling Co. 1 Burke, Almon Weaver Sur., A-1336. Dry. TD 2,600 ft.

Fort Bend County: Humble Oil & Refining Co. 1 Albright et al, Joseph D. Vermillion Sur. 2, A-339. Dry. TD 7,520 ft.

Goliad County: 2nd M. E. Andrews, Ltd., and Dallas Husky 1 Rolf, N. G. Stebbins Sur., A-256. Dry. TD 4,958 ft.

O. Neathery, Jr., 1 Irby, William Stewart Sur., A-254. Dry. TD 3,580 ft.

Hardin County: Neil McDowell 1 Blackington, McKinney & Williams Sur. 40, A-402. Dry. TD 2,860 ft.

Harris County: Claud B. Hamill and Harrell Drilling Co. 1 Spears, Dan O'Neal Sur., A-617. Dry. TD 6,814 ft.

Carnes W. Weaver 1 Kitzmann et al, M. Bey Sur., A-154. Dry. TD 7,325 ft.

Jackson County: H. J. Porter et al 1-C Drushel, Section 2, Hays Ranch Subd., R. T. Crain Sur., A-297. IP 5,700 M.c.f. daily, open flow, casing perforations 5,553-57 ft. TD 5,600 ft. (Extends, and new pay in Carmichael field.)

H. J. Porter et al 1 Carmichael, R. T. Crain Sur., A-297. IP 2,600 M.c.f. daily, casing perforations 4,184-87½ ft. TD 5,128 ft. (New field—Carmichael.)

Jefferson County: Sun Oil Co. 1-A Kolander Unit, Sophia Dean Sur., A-16. (China area). Dry. TD 8,515 ft.

Matagorda County: H. E. Dishman 1 Stovall, I & GN Sur. 1, A-239. Dry. TD 10,450 ft.

J. M. Flaitz and R. B. Mitchell 2 Pierce Ranch, I & GN Sur., Sec. 6, A-249. Dry. TD 8,685 ft.

Frazier-Steinberger et al 1 Trull, I & GN Sur. 6, A-289. Dry. TD 9,016 ft.

Polk County: R. B. Gilmour et al 1 Skipper-Withers, P. J. Menard Sur., A-50 (Ace area). Dry. TD 4,969 ft.

Wharton County: John B. Coffee 1-D Kountze and Stewart, P. J. Poole Sur. 10, A-616. Dry. TD 8,715 ft.

Howell, Holloway & Howell 1 Lakeside Irrigation Co. unit, Sec. 17, GH & H Sur. IP 2,720 M.c.f. daily, 16/64-in., 44 ft. (Yegua). TD 9,687 ft. (Extends 44 ft. (Yuga). TD 9,687 ft. (Extends Lizzie field.)

EAST TEXAS

Camp County: J. B. Stephens, Jr. and A. O. Phillips 1 Reeves, E. B. Davis Sur., A-35. Dry. TD 4,692 ft.

Henderson County: R. E. Smith 1 Arlie D. Wood, J. P. Brown Sur., A-59. Dry. TD 7,100 ft.

Kaufman County: S. A. Cochran et al 1 W. R. McDaniel, T. Stokeley Sur., A-446. Dry. TD 5,056 ft., Paluxy 4,991 ft.

Morris County: B. G. Byars 5 Paul Pewitt, G. W. Dyer Sur. Dry. TD 4,740 ft.

Titus County: Sohio Petroleum Co. 1-A Prewitt, John Tumlinson Sur., A-563. Dry. TD 4,750 ft.

Van Zandt County: T. L. Ford 1 Pennington, 6 miles SE Canton. Dry. TD 4,000 ft.

WEST CENTRAL TEXAS

Brown County: Johnson & Warren 1 Milner, Subd. 8, H. P. Brewster Sur. 790. Dry. TD 1,297 ft.

Coleman County: Frank W. Burger 1 Julia Mead, Coleman Townsite location. Dry. TD 2,352 ft.

Gilchrist Drilling Co. 1 Sealy-Smith Foundation, 43-2-GH&H. Dry. TD 2,997 ft.

Sik Katz and R. H. Venable 1 Adkins, 72-1-GH&H. Dry. TD 2,447 ft.

Sid Katz Exploration Co. 1 Mrs. Foy Gordon, Sec. 668, M. D. J. Trevino Sur. Dry. TD 2,371 ft.

J. E. Therrell and F. W. Burger 1 Bryam, Sec. 99, Tyler Tap Sur. Dry. TD 1,140 ft.

J. E. Therrell 1 Copeland, 75-1-GH&H. Dry. TD 2,822 ft.

Westates Petroleum Corp. 1 Victoria Snell, 15-2-T&NO. Dry. TD 3,650 ft.

Eastland County: Ada Oil Co. 1 F. R. Woodson, 82-3-H&TC. Dry. TD 3,293 ft.

Haskell County: G. E. Kadane & Sons 1 Russell Grand, J. McGee Sur. 36, A-316. Dry. TD 5,211 ft.

Jones County: Robinson & Puckett and American Liberty Oil Co. 1 Pittman, 42-1-BBB&C. Dry. TD 2,845 ft.

Throckmorton County: Warren Petroleum Corp. 1 J. B. Davidson, Sec. 1693, TE&L Sur. IP 384 BOPD, 18/64-in., 41°, Caddo perforations 3,948-58 ft. TD 4,768 ft. Davidson-Caddo proposed new field name.

NORTH TEXAS

Archer County: W. A. Lofton 1 Parkey, SPRR Sur., A-419. Dry. TD 1,793 ft.

Lofton 1-A Parkey, SPRR Sur., A-419. Dry. TD 1,808 ft.

Lofton 1-B Parkey, SPRR Sur., A-1078. Dry. TD 1,776 ft.

Lofton 1-C Parkey, Sec. 1, SPRR Sur. Dry. TD 1,719 ft.

Lofton 1-D Parkey, Sec. 3, SPRR Sur. Dry. TD 1,719 ft.

Clay County: Reed Pigman 4 Paul Dowdy, Bacon Subd., 3 miles SW Charlie. IPP 20 BO in 14 hours, 42°, sand pay 1,232 ft. TD 1,234 ft.

Cooke County: H. J. Kirk 1 Trew, M. L. Stipe Sur., A-1731. Dry. TD 1,865 ft.

Jay Simmons 1 Clark Howser, Sec. 5, Blk. 6, University League. Dry. TD 4,207 ft.

Jack County: Denzil Morrow 1 J. H. Bryant, Wm. Berryman Sur., A-40. Dry. TD 495 ft.

Denzil Morrow 2 Bryant, Berryman Sur., A-40. Dry. TD 535 ft.

Montague County: Ranger Oil & Gas Co. 1 Brown, H. Ravenstone Sur., A-638. IP 48 BOPD, 12/64-in., 43°, conglomerate pay 6,224-32 ft. TD 6,234 ft.

Republic Natural Gas Co. 1 Brewer, R. T. Rieger Sur., A-641. Dry. TD 7,703 ft.

Wilbarger County: Fortex Oil Co. 1-A W. T. Waggoner, 10-14-H&TC. IPP 76.7 BOPD, 36°, pay 2,783 ft. TD 2,791 ft.

Frank Wood Associates, Inc. 1 Waggoner "Zebra," 30-4-H&TC. IPP 33.5 BOPD, 36°, pay 2,322 ft. TD 2,507 ft.

Young County: L. T. Burns 1-A Morris, TE&L Sur. 265, A-512. Dry. TD 4,187 ft.

Fitzhugh Petroleum Co. and A. F. Knappenberger 1 Mary E. Martin, I. L. Hill Sur., A-126. Dry. TD 3,810 ft.

Panhandle Oil Corp. 2 Sidney Hunt, Sec. 178, TE&L Sur. IP 192 BOPD, 10/64-in., 41°, Mississippian pay 4,880 ft. TD 4,885 ft.

Ray G. Woods 1 Roy Corbett, B. H. Jayne Sur., A-2016. Dry. TD 4,620 ft.

WEST TEXAS

Andrews County: Anderson-Prichard Oil Corp. 8 W. F. Cowden, 102-W. F. Cowden Strip, SF 9956, 10 miles SW Andrews. IPF 569 BOPD, 49°, 12/64-in., top pay 12,307 ft., Ellenburger 12,296 ft. TD 12,343 ft.

The Texas Co. 1 Texas-Atlantic-Superior-State, 22-12, Univ. Lands Sur. IPF 630 BOPD, 42.4°, ½-in., top pay 10,117 ft. Fusselman 8,880 ft., Ellenburger 10,119 ft. TD 10,272 ft.

Borden County: Vickers Exploration, Ltd., 1 J. R. Canning, 127-25-H&TC. Dry. TD 7,310 ft. Reef 7,105 ft.

Gaines County: Guy Mabee Drilling Co. et al 1 J. C. Newton, 28-A19-PSL. Dry. TD 12,888 ft. dolomite.

Garza County: Sunray Oil Corp. 1 Bobbs, 1249-A-278-AB&M. Dry. TD 5,524 ft. dolomite.

Howard County: Lomax Bros. Producing Co. 1 Veal Memorial Fund, 25-33, T-3-N-T&P. IPF 540 BOPD, 42°, ½-in., top pay 8,206 ft. Reef 8,206 ft. TD 8,242 ft.

Lynn County: Sunniland Oil Corp. 1 Clyde Shaw, 18-L-D&SERR. Dry. TD 4,023 ft.

Midland County: C. E. Marsh II 1 Barron "B," 14-40-T-1-S-T&P. Dry. TD 5,000 ft. lime.

Stanolind Oil & Gas Co. 1 Midland Farms "AF," 1-40-T-1-S-G&MMB&A. IPP 65 BOPD, 30°, top pay 4,600 ft. San Andres 4,700 ft. Grayburg 4,400 ft. TD 4,800 ft.

Reagan County: Sun Oil Co. 1 C. H. Sugg, 40-TCRR Sur. Dry. TD 9,660 ft. Fusselman 9,270 ft.

Terry County: Phillips Petroleum Co. 1

IT'S NEW...FLEXIBLE...SAFER...STRONGER

STRATOLINE...

The Most Streamlined Coupling Ever Made

The new Hewitt-Robins Stratoline Coupling embodies the *strongest, smoothest construction by far ever used on any rotary drilling hose.* This new coupling, with API line pipe threads, is no bigger in diameter than the hose itself—has no protruding parts—is absolutely snag-proof, leakproof, easier to use, saves handling time.

Feature for feature, the new Hewitt-Robins Cable-Reinforced Rotary Drilling Hose with the exclusive Stratoline Coupling meets the most exacting requirements. This new rotary drilling hose is unequalled for safe, dependable, long-life performance and handling ease on any type of rotary drilling rig.

ENGINEERING DATA

CONSTRUCTION: High-tensile airplane cable wire spiraled on, right hand and left hand to equalize tension and control elongation. Third cable coiled on to eliminate dancing and shimmying . . . Has strength to match highest operating pressures—flexibility to drape smoothly on any type of rig.

TUBE: Neoprene-base synthetic compound meets all current operating requirements, including high mud temperatures, oil-based mud and oil emulsions.

COVER: Neoprene-base synthetic compound—resists oil, sun-checking, strain crack, cutting abrasion, weather and temperature extremes. Black with longitudinal yellow stripe to ease alignment.

SAFETY EYE: Permanently fused to hose body 29" from threaded end of coupling at each end of hose for attaching safety chain to derrick and swivel—eliminates need for external clamps.

The new Hewitt-Robins Cable-Reinforced Rotary Drilling Hose is now available at these distributors:

THE BETHLEHEM SUPPLY COMPANY OF CALIFORNIA
MID-CONTINENT SUPPLY COMPANY
NORVELL-WILDER SUPPLY COMPANY
STANDARD SUPPLY & HARDWARE COMPANY

HEWITT HR ROBINS

Executive Offices, Stamford, Connecticut

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam

FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • EXPORT DEPARTMENT: New York City

WILDCAT COMPLETIONS

McLaurin, 36-O-H&OB. Dry. TD 11,990 ft. Dolomite.

Signal Oil & Gas Co. and W. C. Murphy Drilling Co. 1 Corrigan-Akers, 10-M-TT&RR Sur. Dry. TD 5,160 ft. Lime.

Tom Green County: Deep Rock Oil Corp. 1 Jake Harper, 16-16-H&TC. Dry. TD 6,515 ft. shale. Strawn 6,328 ft.

Skelly Oil Co. 1 Ethelywyn Turner, B. Rieman Sur. 238. Dry. TD 9,050 ft. sand 8,012 ft.

SOUTHEAST NEW MEXICO

Eddy County: Richardson & Bass 1 Fidel-Federal, 27-21s-29e. Dry at TD 15,611 ft., PB 6,980 ft. for Delaware discovery. IP 175 BOPD, 35 bbl. salt water, ¾-in., top pay 6,890 ft. Elev. 3,433 ft., Delaware lime 3,253 ft., Bone Springs 6,954 ft., Wolfcamp 10,425 ft., Pennsylvanian 11,700 ft., Simpson 15,580 ft., Silurian 14,570 ft.

Lea County: Sun Oil Co. 1 W. E. Harper-Federal, 26-25s-35e. Dry. TD 14,993 ft. Delaware lime 5,073 ft., Wolfcamp 12,020 ft., Bend 13,630 ft. elev. (?).

Warren-Bradshaw Exploration Co. 1 State, 1-17s-34e. Dry. TD 5,050 ft.

Roosevelt County: Lion Oil Co. 1 J. D. Slack-Federal, 30-6s-33e. Dry. TD 9,640 ft., elev. 4,448 ft., Wolfcamp 7,710 ft., Pennsylvanian 8,167 ft., Devonian 9,310 ft.

W. J. Peterman 2 T. B. McCabe, 31-2s-31e. Dry. TD 3,200 ft.

ILLINOIS

Bond County: Houles Petroleum 1 Miles, SW SE NW 22-5n-3w. Dry. TD 1,133 ft.

Crawford County: H. W. Brinkley 1 Illyes, NE SW SE 5-5n-10w. Dry. TD 953 ft.

DeWitt County: Dr. R. J. Steben 1 Davenport-Jasper Comm., SW NE SW 12-19n-2e. Dry. TD 1,628 ft.

Gallatin County: Chas. C. White 3 Kinsall, NE NW NE 26-7s-8e. Dry. TD 3,016 ft.

John W. Rudy 1 Strong heirs, NE NE SE 19-9s-9e. Dry. TD 2,671 ft.

Richland County: Calvert Drilling Co. 1 Franklin, NE NW SE 34-5n-10e. Dry. TD 3,003 ft.

St. Clair County: J. A. Heid 1 Klein, SE SW SE 29-1s-8w. Dry. TD 1,420 ft.

Wayne County: Nash Redwine 1 Reedy, NW NE SW 2-2s-6e. Dry. TD 3,390 ft.

Washington County: Jet Oil Co. 2 Hunleth, SE SW SW 28-3s-4w. Dry. TD 1,350 ft.

INDIANA

La Grange County: Pure Oil Co. 1 Huff, SE SE SE 23-37n-11e. Dry. TD 807 ft.

Pike County: Buchman & O'Neal 1 Anderson, SW SW SW 28-1n-7w. Dry. TD 1,352 ft.

Vigo County: Sun Oil Co. 1 Gravel Unit Commission, NE NW SW 26-13n-9w. Dry. TD 986 ft.

F. B. Cline 1 Truex-Tracer-Coal-Chesser, NE NE SW 26-12n-8w. Dry. TD 824 ft.

MICHIGAN

Grand Traverse County: Carter Oil Co. 1 Lemcool, SE SW SW 9-25n-10w. Dry. TD 7,269 ft. in Niagaran (and below).

Kent County: Augie Busk & Carl E. Grimes 1 Jones, NW SW NE 24-9n-11w. Dry. TD 2,242 ft. in Traverse lime.

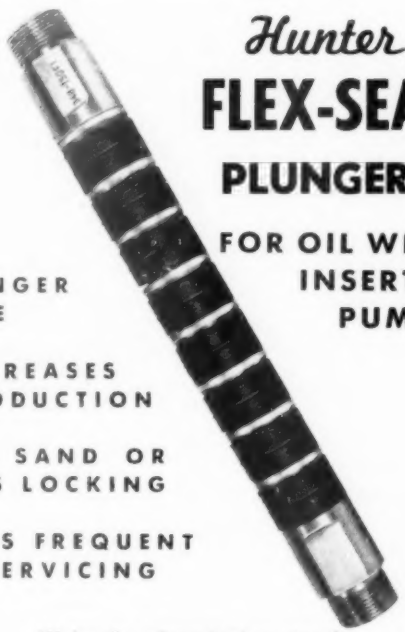
Montcalm County: Socony-Vacuum Oil Co., Inc. 1 Fitsimmons, NE NE SE 27-12n-6w. Dry. TD 3,569 ft. in Dundee-Monroe.

PIPE INSPECTION
INTERNAL - EXTERNAL
By Magnetic Process
of your
• CASING • TUBING
• DRILL PIPE
• DRILL COLLARS

WITH magnetic particle inspection by Western Inspection, you can detect minute flaws which cause pipe failures before you start a job. Our new equipment brings a high degree of accuracy to inspection services and a photographic record of the pipe's defects eliminates the chance for mistakes and gives positive, easily understood reports.

WESTERN
Inspection Co.
Call Us for Service at
ODESSA - MIDLAND - HOUSTON
McALLEN or LAFAYETTE, LA.

Hunter
FLEX-SEAL
PLUNGERS
FOR OIL WELL
INSERT
PUMPS

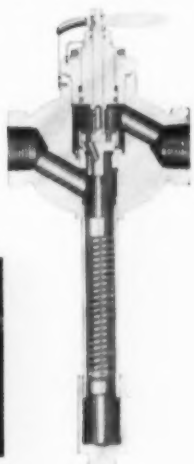


LONGER LIFE
INCREASES PRODUCTION
NO SAND OR GAS LOCKING
LESS FREQUENT SERVICING

Write for descriptive circular
MANUFACTURED UNDER HUNTER PATENT NO. 2240780, 2475705, BY
W. H. HUNTER ENGINEERING CO.
150 Marlborough Drive
Pontiac 19, Mich.

THE BOWEN AUTOMATIC FLOW CONTROL

A Completely New And Revolutionary Device For Controlling The Flow Of Producing Wells



- Automatically controls production
- Automatically prevents excessive loading
- Permits positive regulation at the lowest possible gas-oil ratio
- Reduces paraffin problems to a minimum
- Automatically controls gas surges

The Bowen Automatic Flow Control is economical in price, easy to install, and simple to operate.

Write For Descriptive Bulletin!

SR BOWEN CO

WILDCAT COMPLETIONS

Osceola County: Columbia Oil & Gas Co. 1 Custer, SE NE NW 22-17n-8w. Dry. TD 3,981 ft. in Dundee.

Ottawa County: Muskegon Development Co. 1 Thies, NW SE SW 4-8n-15w. Dry. TD 1,806 ft. in Traverse lime.

Ottawa County: Admiral Oil Corp. 1 Kraemer, NE NE NE 17-7n-13w. Dry. TD 1,928 ft. in Traverse lime.

Shiawassee County: Fisher-McCall Oil & Gas, Inc. 1 Service, NW SE SE 24-5n-2e. Dry. TD 2,278 ft. in Dundee-Monroe.

Van Buren County: John D. S. Hamson 1 Fields, SW NW SE 30-3s-15w. Dry. TD 1,037 ft. in Traverse lime.

KENTUCKY

Daviess County: J. C. Miller and Ashland Oil & Refining Co. 1 Clark, NW SW SW 25-O-27. Dry. TD 2,320 ft.

Coy Oil Co. 1 (2) Jack Terrel, SW NE SE 25-P-30. Dry. TD 1,475 ft.

Henderson County: Paul Rossi 1 Gaines, NW NW SE 17-Q-21. Dry. TD 2,775 ft.

WEST VIRGINIA

Webster County, Glade district: Gregory Gas Co. 1 C. D. Howard heirs, 2,929,000 cu. ft. gas, Maxon sand, 1,395 ft., gas 1,399-1,460 ft. TD 1,462 ft.

FLORIDA

Okaloosa County: G. G. Green and Clinch Drilling Co. 1 State, NE SE NW 5-5n-25w. Dry. TD 5,972 ft. Elev. 208 ft., Chalk 2,985 ft., Eutaw 4,490 ft., marine Tuscaloosa 5,140 ft., lower Tuscaloosa 5,430 ft., Massive 5,582 ft.

ALABAMA

Escambia County: Stanolind Oil & Gas Co. 1 Owens, N½ SW SE 32-2n-6e. Dry. TD 6,641 ft. Elev. 273 ft., Wilcox 1,688 ft., chalk 3,784 ft., Eutaw sand 5,083 ft., marine Tuscaloosa 5,894 ft., lower Tuscaloosa 6,134 ft., Massive 6,272 ft.

MISSISSIPPI

Amite County: Sun Oil Co. 1 Whittington, 20-4n-4e. Dry. TD 7,309 ft. (Stratigraphic test.)

Jefferson County: Durbin Bond & Co., Inc., 1 Smith, 40-8n-1e. Dry. TD 6,523 ft. Elev. 292 ft., Wilcox 3,9996 ft., Artman 5,697 ft., base Baker shale 5,802 ft.

Monroe County: Magnolia Petroleum Co. 1-A Snow, SW NW NE 27-13s-7e. IPP 203 BOPD (net), 35°, Knox dolomite 4,753-56 ft. TD 4,769 ft. Elev. 298 ft., Mississippian 2,012 ft., Iowa 3,347 ft., Devonian 3,497 ft., Silurian 4,013 ft., Ordovician 4,148 ft., Knox dolomite 4,570 ft. (New field—New Hope.)

Pearl River County: American Liberty Oil Co. and I. P. La Rue 1 Hatten et al, 1-1s-14w. IP 144 BOPD, 6/64-in., 42.4°, casing perforations 7,416-21 ft. (Eutaw). TD 8,747 ft. Elev. 286 ft., Wilcox 2,837 ft., Chalk 6,084 ft., marine Tuscaloosa 7,820 ft., lower Tuscaloosa 8,244 ft., Massive 8,541 ft. (Extends, and first oil production in Pistol Ridge field.)

Walthall County: Curtis Kinard 1 Conerly, 10-1n-10e. Dry. TD 10,565 ft. Elev. 296 ft., Wilcox 4,322 ft., Chalk 8,250 ft., Eagle Ford 9,388 ft., lower Tuscaloosa 10,432 ft.

SOUTH LOUISIANA

St. Landry Parish: H. L. Hunt 1 Boagni, 166-7s-4e. Dry. TD 10,947 ft.

St. Mary Parish: R. R. Frankel 1 South Coast, 40-14s-10e. Dry. 7,855 ft.

West Baton Rouge Parish: Shell Oil Co. 1 Australia, Sardine Point area (8 miles south of Baton Rouge). Dry. TD 11,009 ft.

NORTH LOUISIANA

Sabine Parish: Hurley & Bene 1 Webb, 480 ft. N and 290 ft. W SEc NE 26-9n-13w. Dry. TD 5,880 ft.

Tensas Parish: Kirby Petroleum Corp. 1 Miller, C SW NE 15-10n-10e. Dry. TD 5,512 ft. Wilcox 3,323 ft.

Webster Parish: Atlantic Refining Co. 1 Perryman, 2,322 ft. N and 1,802 ft. E SWc 17-18n-8w. Dry. TD 4,115 ft.

ARKANSAS

Arkansas County: Seaboard Oil Corp. "O" core test, C SW SW SW SW 2-5s-4w. Drq. TD 4,356 ft.

Columbia County: J. K. Wadley et al 1 Wilson, near C NE SW 22-16s-19w. Dry. TD 3,851 ft.

Cross County: Cross Oil Co. 1 Whitty, C NE NE 15-8n-3e. Dry. TD 2,910 ft.

Lonoke County: Seaboard "J" core test, C S½ 28-1s-7w. Dry. TD 2,590 ft.

Miller County: N. B. Hunt et al 1 Smith, near NWc SW NW 35-17s-28w. Dry. TD 5,240 ft.

Union County: The California Co. 1 Moore, C SW NE 29-18s-17w. Dry. TD 8,298 ft.

Woodruff County: Magnolia Petroleum Co. 15 core test, 1,390 ft. S and 950 ft. E of NWc 28-8n-2w. Dry. TD 1,548 ft.

Magnolia 17 core test, 975 ft. S and 540 ft. E NWc 6-8n-3w. Dry. TD 815 ft.

Magnolia 16 core test, 2,595 ft. W and 30 ft. N SEc 1-8n-4w. Dry. TD 830 ft.

OKLAHOMA

Cotton County: E. D. Killingsworth 1 Smith, N½ SE SE SE 28-2s-10w. Dry. TD 1,792 ft.

Jefferson County: Paul Hamner 1 Cassidy, NE NE NW SE 26-3s-4w. Dry. TD 684 ft.

Kay County: Tom-A-Hawk Petroleum Co. and Derby 1 Howe, NE SW SW 23-25n-1e. Dry. TD 4,152 ft.

Lincoln County: Blackwell Oil & Gas Co. 1 Pottle, SW SW NW 14-13n-3e. Dry. TD 4,699 ft.

Davon Oil & Gas Co. 1 Bailey-Griswold, NE NE NE 34-16n-3e. Dry. TD 4,365 ft.

R. L. Kemp and R. E. Morris Drilling Co. 1 Hoyt, SE SE NE 17-16n-5e. Dry. TD 3,442 ft.

Murphy Oil Co. of Oklahoma 1 Blair, NW NW NW 26-17n-4e. Dry. TD 4,352 ft.

Logan County: A. B. Ramsey 1 Dobson, SW NW SW 17-17n-1e. Dry. TD 5,173 ft.

Dillon Oil Corp. and L. C. Tharpe 1 Castle, NW NW SE 34-16n-3w. Dry. TD 6,326 ft.

Falcon Seaboard Drilling Co. 1 Welch, SW SW NW 2-17n-3w. Dry. TD 6,192 ft.

Noble County: S. C. Yingling Oil Operators 1 State, SE SW NE 13-21n-2e. Dry. TD 2,930 ft.

Okfuskee County: Pipe Sales & Service 1 Miller, NE SW NW 14-13n-10e. Dry. TD 3,517 ft.

Oklahoma County: American Charter Oil Co. 1 Doster, SE SW SE 28-14n-1e. Dry. TD 5,737 ft.

R. M. Jordan 1 Frazier, NE SE NE 24-14n-1w. Dry. TD 5,840 ft.

Pawnee County: Ditsworth & Newlin 1 Dallas, NW NE SE 6-21n-6e. Dry. TD 2,430 ft.

Barton & Rich Drilling Co. 1 Rice, NE SE SW 13-23n-5e. Dry. TD 3,036 ft.

Pittsburgh County: Atkinson & Adkins 1 Alley, SW SW NW 17-8n-15e. IP 75 M.c.f. of gas per day, Fears, 1,930-2,030 ft. 2,250 ft. (gas discovery.)

Texas County: United Producing Co. 1 Kelly, C SE NE 2-4n-10eCM. IPF 22 BOPD, Keyes sand 4,711-40 ft. TD 5,034 ft. (Oil discovery.)

Tillman County: Jim Fish 1 Clapp, E½ W½ SW NE 12-2s-16w. Dry. TD 1,739 ft.

KANSAS

Barton County: Bennett & Roberts 1 Shelton, NE NE NW 3-16s-15w. Dry. TD 3,475 ft.

Northern Pump 1 Maneth, SE NE NW 3-18s-15w. Dry. TD 3,614 ft.

Butler County: Rex & Morris 1 Anderson, SW NE NE 14-26s-3e. Dry. TD 3,063 ft.

Edwards County: Natural Gas & Oil et al 1 Campbell, SE SW SW 18-24s-16w. Dry. TD 4,640 ft.

Ellis County: Stewart Bailey et al 1 Weber, SW SW SW 28-14s-19w. Dry. TD 3,744 ft.

Finney County: Continental Oil Co. 1 Klaysteuber, SE NE NW 29-26s-31w. IP 2,000 M.c.f. of gas per day, 2,640-94 ft. TD 5,734 ft. (Gas discovery.)

Ford County: Northern Natural 1 Bierwagen, C SE NW 10-26s-21w. Dry. TD 4,915 ft.

Graham County: Peel-Hardman 1 Emery, NE NE SW 29-8s-21w. Dry. TD 3,763 ft.

Kingman County: The Texas Co. 1 Graber, SE NE SW 30-29s-5w. IPF 1,901 BOPD, Simpson 4,468-80 ft. TD 4,614 ft. (Opens Orsemus pool.)

Morton County: Huber Corp. 1 Breeding, NE SW NW 18-31s-40w. Dry. TD 5,553 ft.

Pawnee County: Bay Petroleum Co. 1 Dupree, NW NW SW 13-21s-15w. Dry. TD 3,810 ft.

Imperial Drilling Co. 1 Thomas, NW NW NW 30-21s-16w. Dry. TD 3,944 ft.

Musgrove 1 Jones, NW NW SW 18-22s-15w. Dry. TD 4,015 ft.

Rooks County: Trans-Era and Delta Producing 1 Swaney, NW NW NW 4-8s-18w. Dry. TD 3,466 ft.

Sunray Oil Corp. 1 Sparks, SW SW NE 3-10s-19w. Dry. TD 3,721 ft.

Rush County: W. J. Coppinger 1 Schroter, SW SW SE 17-19s-17w. Dry. TD 4,009 ft.

Russell County: Anschutz Drilling Co. 1 Duerman, SW SW NW 21-12s-14w. Dry. TD 3,288 ft.

Advance Drilling Co. 1 Anschutz, NE NE NE 14-14s-12w. Dry. TD 2,290 ft.

Stafford County: National Coop. 1 Smith, SE SE NE 29-21s-11w. Dry. TD 3,632 ft.

Petroleum, Inc. 1 McMillan, SW SE SE 31-22s-14w. Dry. TD 4,104 ft.

Helmerich & Payne 1 Copeland, SE SE NE 10-25s-13w. Dry. TD 4,335 ft.

Trego County: D. R. Lauck 1 Unrein, NE NE NE 34-15s-21w. Dry. TD 4,357 ft.

Wichita County: J. S. Woodward 1 Alexander, NW NW SE 4-20s-35w. Dry. TD 5,114 ft. Mississippian 4,980 ft.

Woodward 1 Lehner, SE SE NE 6-20s-36w. Dry. TD 5,055 ft. Miss. 4,944 ft.

NEBRASKA

Chase County: Northern Natural Gas Producing Co. 1 Baldwin, NW NW NE 24-8n-38w. Dry. TD 5,185 ft. Granite 5,140 ft.

Cheyenne County: Plains Exploration 1 Chambers, NW NW NW 13-12n-49w. Dry. TD 4,600 ft. "J" sand 4,489 ft.

Cheyenne County: Wm. R. Whittaker Co., Ltd. 1 Siefer, SW SW SE 30-17n-47w. Dry. TD 4,377 ft. Skull Creek 4,377 ft.

Kimball County: Chaney, Mid-Continent Petroleum 1 Chaney, NE NE NE 27-13n-57w. IP pumped 75 BOPD, "J" sand discovery—new field. "J" sand 6,970 ft. TD 7,055 ft.

NORTH DAKOTA

Bottineau County: Ward Williston Drilling 1 State, NE SW NW 36-164n-80w, IP pumped 32 BOPD, Charles discovery—new field. Charles 3,205 ft. TD 3,215 ft.

Ramsey County: S. D. Johnson 1 Werner, SW NE 11-158n-63w. Dry. TD 3,340 ft. Pre-Cambian 3,335 ft.

Ward County: Sam G. Harrison 1 J. H. Anderson et al, SW SW 21-157n-85w. Dry. TD 8,107 ft. Dawson Bay 7,985 ft.

CALIFORNIA

Fresno County: P. A. Dohney, Opr. 1 Noble, 5-15s-17e. Dry. Kreyenhager 5,830 ft., Cretaceous 6,290 ft., TD 6,420 ft.

Glenn County: Sunray Oil Corp. 1 Sunray-Huffmaster Unit, SW SW 24-19n-2w, IPF 1,800 M.c.f. daily, 850 psi. tubing pressure, perfs. 3,660-80 ft., TD 6,536 ft. ½-mile west extension to Beehive Bend field).

Kern County: Macrate Oil Co. 3 West Lawson Bennet, 26-30s-29e. Dry. Santa Margarita 2,799 ft., schist 2,834 ft., TD 2,837 ft.

North Star Mining & Dev. Co. 1 Tunis-North Star, 4-10n-18w. Dry. TD 1,609 ft.

Oceanic Oil Co. 1 Westates, 18-32s-23e. Dry. TD 4,045 ft.

The Texas Co. 1 Arvin Unit-1, NW NE 26-31s-29e, IPF 119 BOPD, 9 64-in. choke, 39° gravity, perfs. 5,835-6,430 ft. in Chanac sand, OWPB, TD 7,048 ft. (New Chanac pool in North Arvin field.)

Los Angeles County: Union Oil Co. 2 Carmenita Community, 8-3s-11w. Dry. TD 5,400 ft.

Western Empire Petroleum Co. 1 Curran, 20-4n-15w. Dry. TD 3,783 ft.

Orange County: Wilson Oil Co. 1-3 Talbert, 14-6s-11w, IPP 200 BOPD, 16° gravity, perfs. 3,890-3,940 ft., TD 5,640 ft. (New Talbert zone pool discovery in Huntington Beach field).

San Benito County: Oceanic Oil Co. 1 Maggini, 10-18s-9e. Dry. TD 4,967 ft.

Standard Oil Co. of California 4-35 Wright, 35-18s-9e. Dry. TD 3,847 ft.

Ventura County: Shell Oil Co. 1 N. J. Schieferle, 17-3n-20w. Dry. TD 6,528 ft.

MONTANA

Garfield County, East McTwiggen: Ralph Lowe 1 Sandquist, C NE SW 28-16n-36e. Dry. TD 8,128 ft. Cambrian 8,033 ft.

E. Skunk: Shell Oil Co. 14-34 Williamson, SW SW SW 34-16n-42e. Dry. TD 9,369 ft. Winnipeg 9,299 ft.

WYOMING

Carbon County, Brown Canyon: U-Tex Oil 1 "A" UPRR, C NW NW 35-24n-88w. Dry. TD 4,000 ft. Tensleep 3,586 ft.

Hot Springs County, Copper Mountain: Sohio Petroleum Co. 1 Picard, NE SW NE 27-41n-91w. Dry. TD 1,133 ft. Amsden 984 ft.

Niobrara County, E. Ant Hills: Schoonover Oil Development Co. 1 Mortenson, NE NW SW 17-37n-62w. Dry. TD 5,223 ft. Lakota 51,90 ft.

Sweetwater County, Pine Buttes Unit: Shell Oil 33-35 Unit, NW NW SE 35-15n-99w. Dry. TD 6,714 ft. Tipton Tongue 4,768 ft.

Washakie County, Cotton Wood Creek: Stanolind Oil & Gas 1 Unit, C SW SW 2-47n-91w. IP pumped 188 BOPD, Phosphoria discovery—new field. Tensleep 7,515 ft. TD 7,552 ft. PB 7,440 ft.

COLORADO

Adams County: Sinclair Oil & Gas 8 Grace Causey, NE NE SW 15-2s-57w. Dry. TD 5,541 ft. "J" sadd 5,428 ft.

WILDCAT COMPLETIONS

Logan County: Shell 1 State, W½ NW SE 19-8n-53w. Dry. TD 5,064 ft. Dakota 4,973 ft.

Morgan County: The Chicago Corp. and Republic Natural Gas 1 Charles Kincheloe, NE NE SE 34-1n-55w. Dry. "J" sand 4,854 ft. TD 5,027 ft.

Gilliam Drilling Co. et al 1 Hayes, NW NE SW 24-1n-56w. Dry. TD 5,261 ft. Skull Creek 5,258 ft.

Lion Oil 1 Martin, SE SE NE 25-1n-57w. Dry. TD 5,695 ft. "M" sand 5,638 ft.

Rio Blanco County, Urado: Continental Oil Co. and English Oil Co 1 Government, NE NW NE 31-4s-103w. Dry. TD 3,850 ft. Mancos B zone 3,116 ft.

Sedgwick County, Marks Butte: Stanolind Oil & Gas 1 Donaldson, C SE NE 26-10n-47w. IPF 2,080 cu. ft. gas per day, "D" sand discovery—new field. "J" sand 3,931 ft. TD 4,065 ft.

Washington County: Lion Oil Co. 1 Elizabeth, SW SW NE 9-2s-56w. Dry. TD 5,500 ft. "M" sand 5,464.

Twin Oil Corp. 1 State, NE NE SE 36-4n-54w. Dry. TD 5,090 ft. "J" sand 4,932 ft.

UTAH

Emery County, Mounds: Equity Oil 4 Mounds, C SE SW 4-16s-12e. Dry. TD 4,671 ft. Cocomino 4,620 ft.

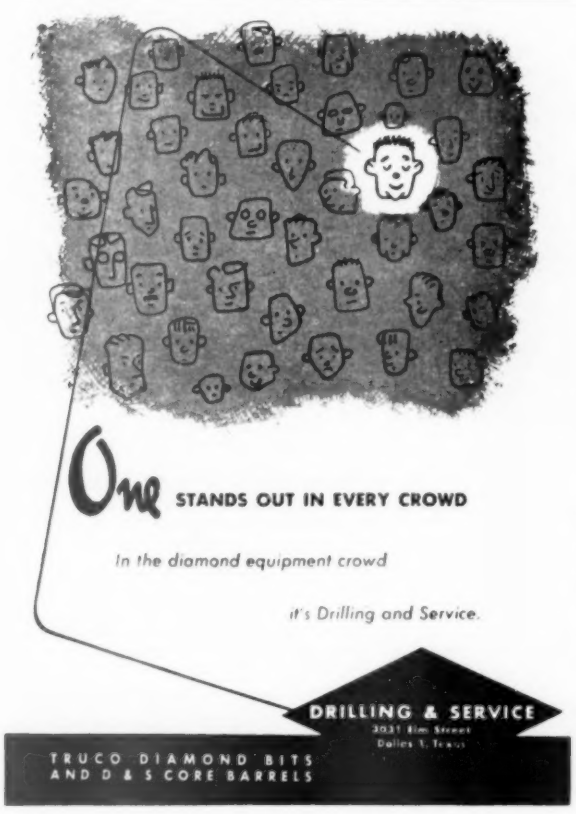
SASKATCHEWAN

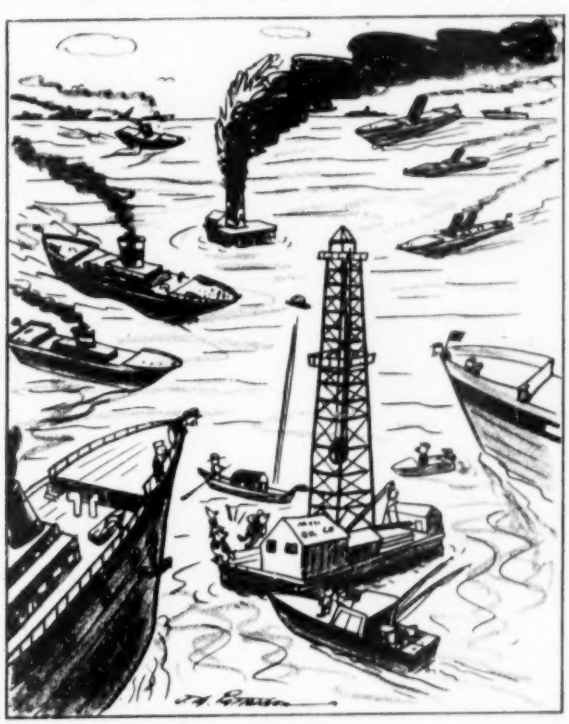
Socony-Sohio 1 Cymric, LSD 10, 20-26-22w2. Dry. TD 3,102 ft.

California-Standard 6-30 Fillomer LSD 6, 30-11-9w2. Dry. TD 4,705 ft.

Seaboard-Tide Water-Herbert 4-11 Crown, LSD 4, 11-17-10w3. Dry. TD 4,160 ft.

(Continued on page 203)


One STANDS OUT IN EVERY CROWD
In the diamond equipment crowd
it's Drilling and Service.
DRILLING & SERVICE
2031 Elm Street
Dallas 1, Texas
TRUCO DIAMOND BITS
AND D & S CORE BARRELS



THE OIL AND GAS JOURNAL

"All of them say th' same thing—they thought it was an S.O.S. flare."

THERE'S AN INSLEY WORKING NEAR YOU

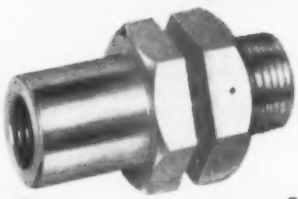
ON A PIPELINE PROJECT

The Insley Line includes excavators and cranes, 5 to 30 ton capacity • rubber or crawler mounted • gasoline, diesel or electric powered. There's an Insley working near you on a pipeline project.

INSLEY MANUFACTURING CORP. • INDIANAPOLIS
wholly owned subsidiary
THE MAXI CORPORATION, LOS ANGELES

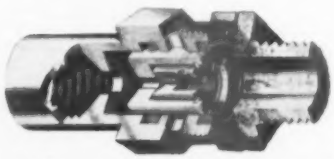
Now Available!

DEUBLIN Quick-Release VALVE



Guaranteed Not to Chatter!

Here is the CHATTER-PROOF, trouble-free quick-release valve you have been waiting for. Compact and precision-built, the Deublin valve is designed to handle air pressure from 0 to 250 p.s.i. on pneumatic clutches up to 1500 H.P.



2⅛" over-all length; weight, 1½ ounces.

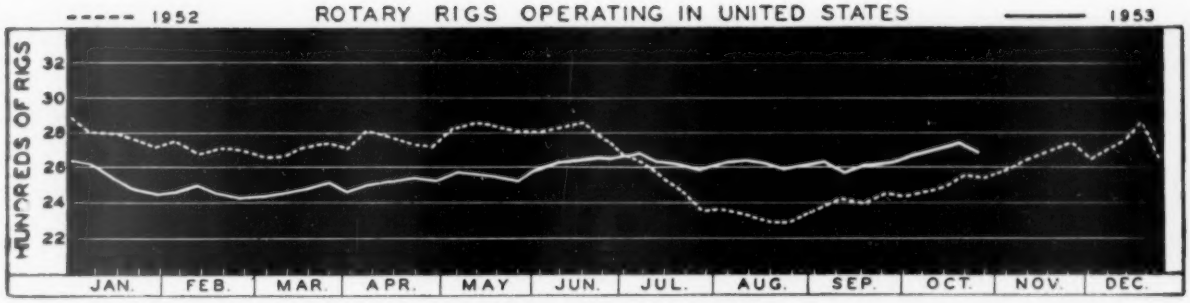
Advanced engineering and performance features make this Deublin unit outstanding.

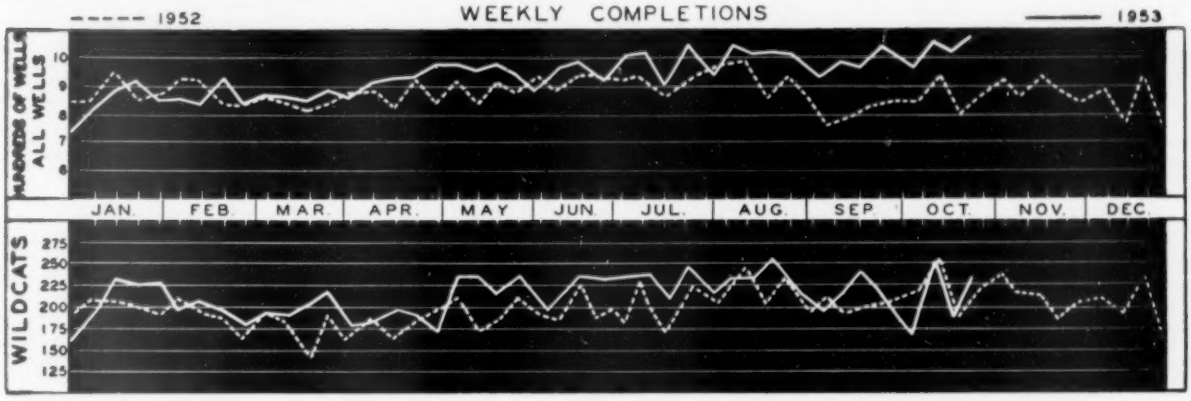
- ✓ It is guaranteed *not* to CHATTER.
- ✓ Its light weight permits its use on rotating elements without disturbing dynamic balance.
- ✓ The Deublin built-in orifice prevents accidental removal of the orifice from the line and eliminates possibility of pressure equalization which causes CHATTER.
- ✓ Double-piston design assures smooth, positive, quick releasing action.

Ask your local supply store for the complete details on the Deublin Quick-Release Valve.

Also get facts about the dependable Deublin Rotating Air Unions.

DEUBLIN COMPANY
Precision Products for the Petroleum Industry
3155 Waukegan Road, Glenview, Illinois





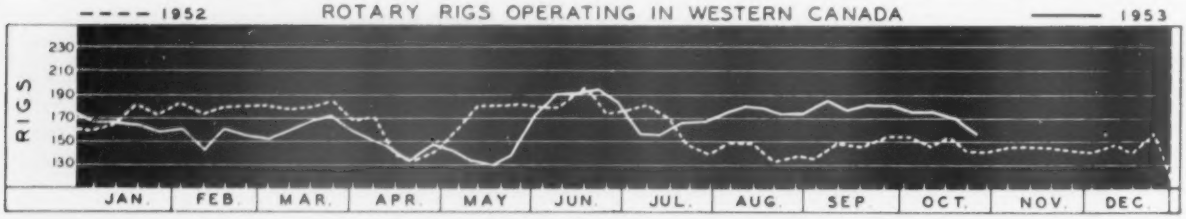
CURRENT STATISTICS

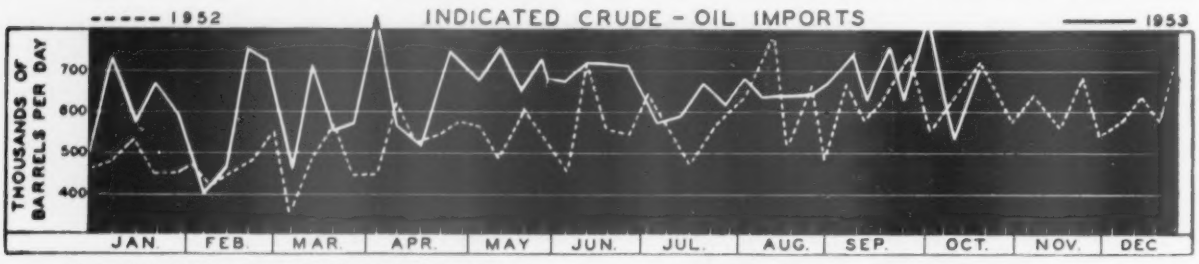
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 24, 1953

	Total of all wells					Oct. 24		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	16	8	0	*8	23,500	619	664	0	0	0	0	0	0	0	0	0	0
Pennsylvania	40	21	2	†17	67,750	1,549	1,639	0	0	0	0	0	0	0	3	12	15
West Virginia	10	0	10	0	30,113	503	483	0	0	1	0	1	0	0	10	5	15
Ohio	12	3	4	5	20,893	867	842	0	0	0	0	0	2	0	3	13	18
Indiana	21	6	1	14	28,782	1,049	1,028	0	0	0	4	4	12	0	2	288	302
Kentucky	30	11	7	12	71,203	923	1,053	0	0	0	3	3	8	0	1	157	166
Illinois	50	28	0	22	136,862	1,639	1,710	0	0	0	9	9	5	0	0	340	345
Michigan	15	4	1	10	40,264	499	581	0	0	0	8	8	15	0	5	210	230
Kansas	99	47	5	‡47	340,243	3,975	3,725	1	0	1	23	25	78	0	31	624	733
Nebraska	6	1	1	4	32,328	266	243	1	0	0	3	4	15	0	5	111	131
Oklahoma	171	105	9	57	571,800	6,068	4,684	1	0	1	17	19	99	6	28	503	636
Texas	327	200	11	116	1,448,766	13,912	14,238	10	2	4	85	101	713	51	147	3,421	4,332
North Central (Dist. 7-B & 9)	125	77	0	48	372,603	5,244	4,568	6	0	0	24	30	373	0	16	1,364	1,753
West (Dist. 7-C & 8)	59	47	0	12	372,040	3,019	4,314	4	0	0	10	14	152	2	12	550	716
Panhandle (Dist. 10)	14	8	6	0	44,602	630	546	0	0	0	0	0	0	2	0	16	18
Eastern (Dist. 5 & 6)	24	15	1	8	102,235	662	661	0	0	0	6	6	19	2	5	220	246
Gulf Coast (Dist. 2 & 3)	40	24	1	15	235,342	2,031	2,160	0	0	4	17	21	87	20	61	546	714
Southwest (Dist. 1 & 4)	65	29	3	33	321,944	2,326	1,989	0	2	0	28	30	82	25	53	725	885
Louisiana	89	43	7	39	492,840	2,197	1,891	0	0	0	6	6	66	30	19	302	417
Northern	52	27	5	§20	142,827	945	1,025	0	0	0	3	3	9	2	2	124	137
Southern	37	16	2	19	350,013	1,252	866	0	0	0	3	3	57	28	17	178	280
Arkansas	19	4	0	15	76,236	442	325	0	0	0	9	9	11	0	0	107	118
Mississippi	12	8	1	3	85,293	308	286	2	0	0	3	5	14	1	4	136	155
Southeastern States	5	3	0	2	26,386	121	56	0	0	0	2	2	1	0	0	98	99
Montana	5	2	0	3	25,424	343	259	0	0	0	2	2	12	0	0	85	97
Wyoming	36	25	0	11	189,055	652	537	1	0	0	4	5	22	0	3	113	138
Colorado	20	5	3	12	104,954	567	370	0	0	1	8	9	24	0	11	248	283
Utah	4	0	2	2	16,358	57	61	0	0	0	1	1	2	0	4	31	37
New Mexico	40	13	17	10	243,260	1,157	843	1	0	0	4	5	19	1	14	104	138
California	46	32	3	11	223,025	2,075	1,979	1	0	1	9	11	54	0	9	463	526
North Dakota	5	3	0	2	31,494	211	85	1	0	0	2	3	9	0	0	55	64
Miscellaneous	0	0	0	0	0	69	92	0	0	0	0	0	1	0	4	41	46
Total United States	1,078	572	84	422	4,326,829	40,068	37,674	19	2	9	202	232	1,182	89	303	7,467	9,041
Total previous week	1,013	523	72	418	3,931,561			17	2	3	165	187	1,163	87	294	7,265	8,809
Total October 25, 1952	868	418	57	393	3,415,613			21	0	5	196	222	1,147	68	205	7,048	8,468

Service wells included: *8, †15, ‡3, §13.

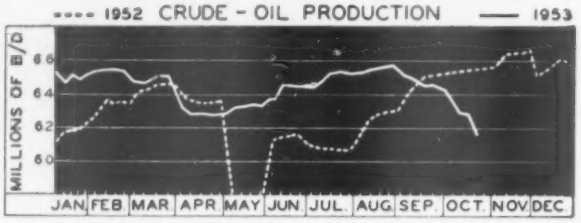


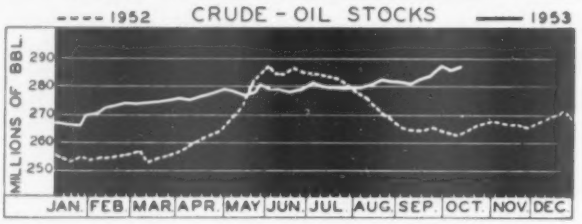


DAILY AVERAGE PRODUCTION FOR WEEK

	October 24 Crude oil	October 24 Lease condensate	October 24 Total	Oct. 17 total
Alabama	4,700		4,700	4,800
Arkansas	73,000	400	73,400	78,950
California	997,500		997,500	998,600
Colorado	106,700		106,700	104,800
Eastern	60,000		60,000	60,000
Florida	1,550		1,550	1,550
Illinois	165,200		165,200	165,400
Indiana	35,000		35,000	32,400
Kansas	209,100		209,100	304,100
Kentucky	32,500		32,500	32,300
Louisiana	587,650	40,050	627,700	638,550
North	95,800	2,550	98,350	109,200
South	491,850	37,500	529,350	529,350
Michigan	32,500		32,500	32,400
Mississippi	84,200	2,100	86,300	94,850
Montana	31,400		31,400	32,700
Nebraska	12,500		12,500	12,600
New Mexico	203,875	550	204,425	204,625
Oklahoma	513,300		513,300	517,900
Texas	2,692,175	46,200	2,738,375	2,738,375
Dist. 1	38,575	350	38,925	38,925
Dist. 2	145,625	5,100	150,725	150,725
Dist. 3	434,600	24,150	458,750	458,750
Dist. 4	254,375	5,700	260,075	260,075
Dist. 5	47,500	400	47,900	47,900
Dist. 6	122,875	5,000	127,875	127,875
East Texas field	244,500		244,500	244,500
Dist. 7-B	117,950	50	118,000	118,000
Dist. 7-C	163,250	4,150	167,400	167,400
Dist. 8	862,225	900	863,125	863,125
Dist. 9	185,325	350	185,675	185,675
Dist. 10	75,375	50	75,425	75,425
Utah	4,400		4,400	4,500
Wyoming	208,700		208,700	211,100
North Dakota	13,600		13,600	13,900
Total U. S.	6,609,550	89,300	6,158,850	6,284,400
Change from previous week, down			125,550	
Canada	236,825		236,825	205,150
Total U. S. production January 1-October 24			1,931,046,725 bbl.	
Same period last year (crude plus cond.)			*1,846,047,625 bbl.	

*Includes 25,214,035 bbl. condensate.



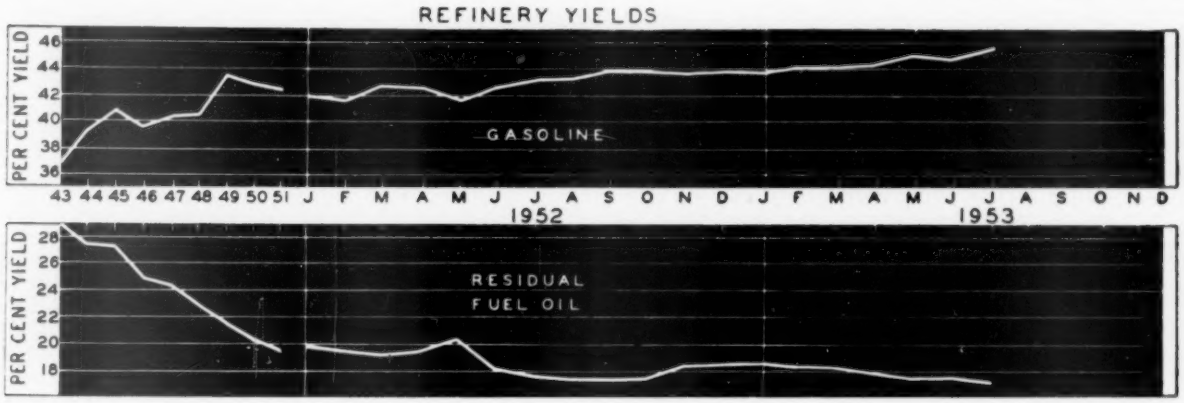


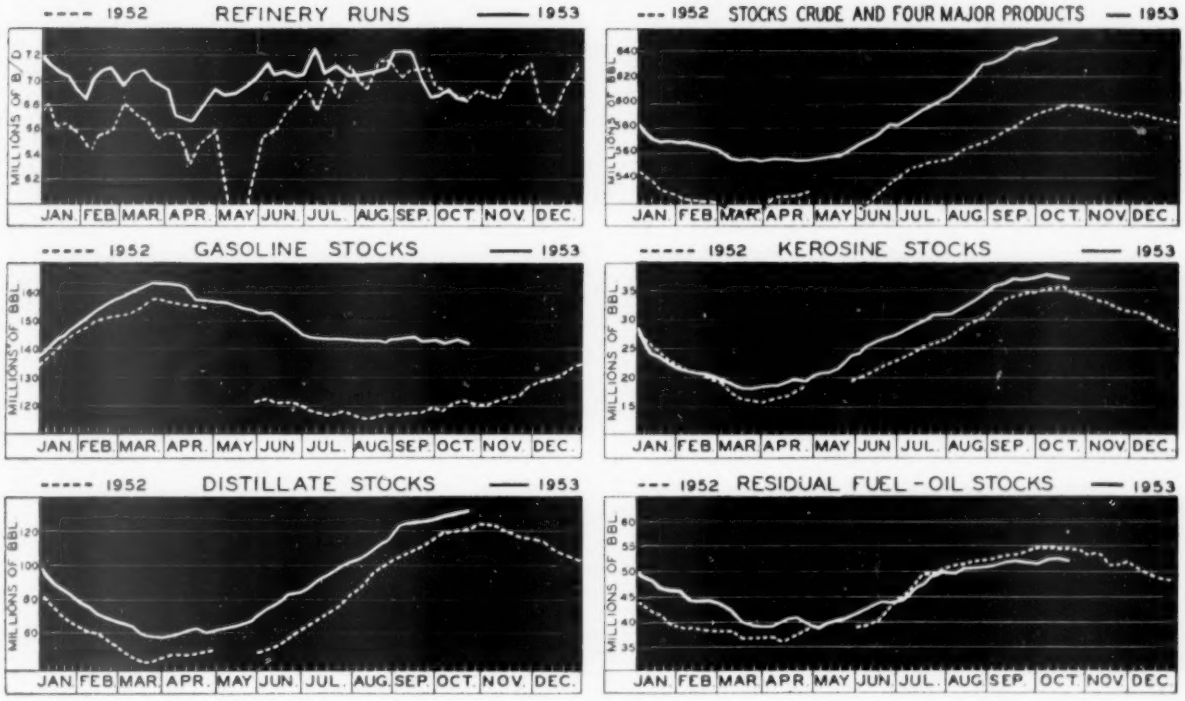
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	Oct. 17, '53	Oct. 10, '53	Oct. 18, '52
Pennsylvania Grade	2,912	2,853	2,308
Other Appalachian	2,078	2,181	2,101
Illinois, Indiana, Michigan	12,058	12,274	11,926
Arkansas	3,486	3,364	2,975
Louisiana	17,244	17,481	15,729
North	2,799	2,955	2,411
Gulf	14,445	14,526	13,318
Mississippi	3,615	3,657	3,150
New Mexico	9,178	9,057	7,366
Oklahoma and Kansas	42,283	42,462	39,156
Texas	134,023	132,777	127,737
East Texas	12,090	11,909	12,591
West Texas	60,480	58,669	58,085
Texas Gulf	28,495	28,910	25,765
Other Texas	32,958	33,289	31,296
Rocky Mountain	16,790	16,440	14,430
California	33,358	33,038	31,452
Foreign	†10,806	10,579	8,136
Total	287,831	286,163	266,466

*Bureau of Mines. †Includes 3,336,000 bbl. in California.


REFINERY YIELDS
PER CENT YIELD
GASOLINE
43 44 45 46 47 48 49 50 51 J F M A M J J A S O N D J F M A M J J A S O N D
1952
1953
PER CENT YIELD
RESIDUAL FUEL OIL

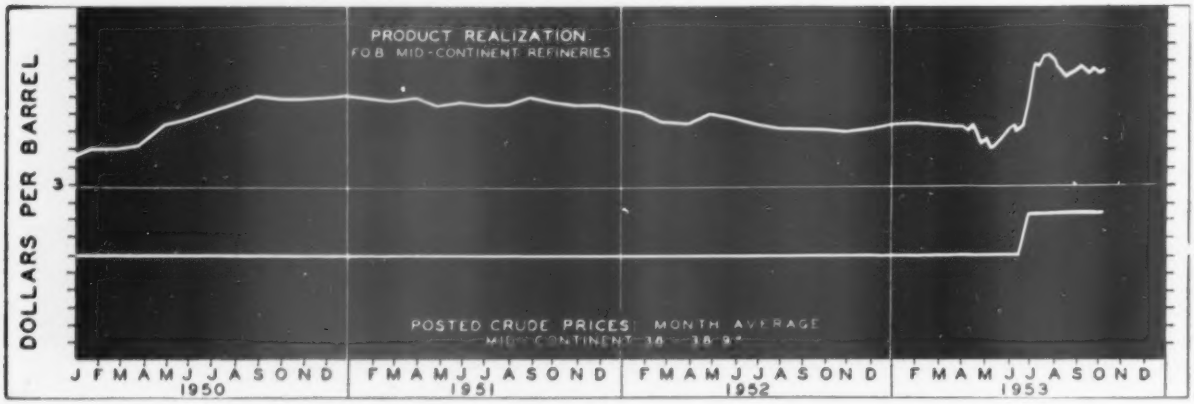

---- 1952 REFINERY RUNS —— 1953
MILLIONS OF B./D.
--- 1952 STOCKS CRUDE AND FOUR MAJOR PRODUCTS — 1953
MILLIONS OF BBL.
----- 1952 GASOLINE STOCKS —— 1953
MILLIONS OF BBL.
----- 1952 KEROSINE STOCKS —— 1953
MILLIONS OF BBL.
----- 1952 DISTILLATE STOCKS —— 1953
MILLIONS OF BBL.
--- 1952 RESIDUAL FUEL-OIL STOCKS — 1953
MILLIONS OF BBL.
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

A.P.I. REFINERY REPORT, OCTOBER 24

(Thousands of barrels)

District—	Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.	Stocks‡ — Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1952 — Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.
East Coast	986	423.8	24.1	251.9	203.9	33,263	15,324	48,403	12,996	1,045	422.7	44.7	254.9	219.6
Appalachian:														
District 1	109	49.9	4.0	21.7	12.9	3,749	612	1,712	760	97	40.8	5.9	17.2	13.9
District 2	85	47.9	5.0	12.0	14.4	1,769	608	645	143	87	40.7	6.7	13.1	13.9
Ind., Ill., Ky.	1,242	687.3	80.2	215.6	166.9	27,208	9,424	24,051	4,738	1,244	674.6	73.6	220.5	159.0
Okla., Kans., Mo.	587	341.6	7.7	137.4	50.1	14,416	2,328	12,904	1,268	565	324.9	11.4	136.6	58.0
Inland Texas	253	170.9	11.3	44.1	31.4	5,799	691	2,450	1,536	265	180.0	12.8	41.4	36.9
Texas Gulf Coast	1,625	807.4	125.9	358.1	238.7	20,322	4,462	16,633	7,206	1,746	780.6	117.5	405.3	268.6
La. Gulf Coast	552	261.4	44.7	136.9	43.6	8,285	2,630	7,540	1,438	525	269.2	61.1	131.0	54.8
N. La. and Ark.	84	36.4	8.3	13.6	6.7	3,198	632	841	136	85	34.4	7.6	21.5	7.0
Rocky Mountain:														
New Mexico	20	12.9		3.0	3.7	155		51	28	18	11.2	0.7	2.9	4.1
Other Rocky Mtn.	225	103.1	1.0	57.7	42.4	4,660	259	2,834	984	205	99.2	5.1	39.4	39.6
California	1,062	431.0	13.1	162.3	351.4	19,842	424	14,703	21,400	1,001	422.5	5.1	173.7	328.5
Oct. 24, 1953	6,830	3,373.6	325.3	1,414.3	1,166.1	142,666	37,394	132,767	52,633	6,883	3,300.8	352.2	1,457.5	1,203.9
Oct. 17, 1953	6,866	3,466.1	382.6	1,484.7	1,180.4	142,796	37,653	130,902	53,103					
Oct. 25, 1952	6,938	3,185.9	356.1	1,504.4	1,213.9	120,767	34,212	121,286	54,101					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


DOLLARS PER BARREL
PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
3
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.66 for week ended October 17, $3.63 for previous week, and $3.33 for October 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of October 28, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11.125-11.625	13-13.8	11-11.75
Premium gasoline	12.125-12.625	14.5-14.8	12.25-12.75
42-44 w.w. kerosine	8.875-9.25	10.4-10.9	8.875-9.5
No. 2 straw fuel oil	7.875-8.25	9.4-9.9	8.25-8.5
No. 6 residual	$1.30-1.35	$2.25-2.40	$1.85-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.10	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13.75
750 vis., No. 3-4 neutral	16.75
2,000 No. 5-6 neutral	18-18.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20.5-21.5
200 vis., No. 3 neutral, 0-10 pp.	14.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	21.5
180 vis., 10 p.t. neutral	25.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

WEAKNESS in major product markets this fall seems to vary directly with the A.P.I. gravity of the product. Heavy fuel, the low-gravity product of the group, is firm in all market areas. Distillate fuel is at the season of the year when stocks have reached a peak and when the lack of movement has some pressure on the market. However, the fact that demand is certain to increase within the next few weeks tends to prevent dumping except in extreme cases.

High gasoline inventories at the end of the summer plus the fact that relatively high stocks of distillate fuel have prevented a shift in refinery yields from gasoline to light fuels have made motor fuel the softest major product.

The pressure on the gasoline market influenced the reduction in natural-gasoline quotations at a time when this product should be selling for the highest price of the year. Grade 26-70 on the Group 3 market is selling for 1.375 cents less than at this time last year. Cold weather will tend to boost the natural-gasoline market by creating a greater demand for blending and also by making available more clean storage for gasoline as distillate moves to secondary suppliers and consumers.

Very little residual fuel is available in the Mid-Continent with no sales reported at less than $1.30 a barrel. However, prices of as much as 15 cents a barrel above the current low probably would cause some shift to other fuels by large residual users.

Major suppliers in the New York Harbor area are quoting 9.9 cents a gallon for barge delivery of No. 2 fuel, but material is reported to be available at 9.4 cents. Some of the distillate that normally would have moved from the Gulf Coast to the East Coast in October has been shifted to November. Even so, East Coast distillate stocks increased 2,700,000 bbl. in the first 2 weeks of October.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87	.....	.....	
15-15.9	1.93	.....	.....	
16-16.9	1.99	.....	.....	
17-17.9	2.05	.....	.....	
18-18.9	2.11	.....	.....	
19-19.9	2.18	.....	.....	
20-20.9	2.24	$2.50	.....	$2.37
21-21.9	2.30	2.52	.....	2.39
22-22.9	2.37	2.54	.....	2.41
23-23.9	2.45	2.56	.....	2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9	.....	2.76	3.09	2.63
34-34.9	.....	2.78	3.11	2.65
35-35.9	.....	2.80	3.13	2.67
36-36.9	.....	2.82	3.15	2.69
37-37.9	.....	2.84	3.17	2.71
38-38.9	.....	2.86	3.19	2.73
39-39.9	.....	2.88	3.21	2.75
40 and above	.....	2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective September 21, 1953.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.05
Southwest Pennsylvania	3.61
West Virginia	3.55
Ohio	3.54
Illinois Basin	3.02

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY... CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 20c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$14.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

FOR SALE at our Oklahoma City warehouse: One used Allis-Chalmers, Model UM single drum tractor well servicing unit mounted on rubber tires. No mast or tools, $850.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

OIL FIELD EQUIPMENT

16,000'—4½" Casing, 11 lb., .85. 900'—7½" Casing, 1.15. 15,000'—⅝" Rods, 125. 2" Lead Line (in ground). Miscell. Fittings. All equipment nearly new. Floyd Hubbard, Virgil, Kansas.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Presser & Son, Pueblo, Colorado.

FOR SALE: Approximately 3600 ft. of 4½" 16.60# drill pipe with Hughes Flash-weld extrahole tool joints. Model BC-6, 200 ton Emsco Swivel. Melton Supply Company, Box 1360, Seminole, Oklahoma.

FOR SALE

16" OD API 5Lx42 E.W. Pipe, 1000 ft. New 52.36# .312" Wall Youngstown P.E. Pipe DRL. From Tulsa Stock. Phone or write

ARDUN SUPPLY CO.
303 So. Frankfort, Tulsa, Okla.
Phone 4-2405

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

Large Diameter NEW STEEL PIPE

8⅝"	O.D.	.250 wall	1250 feet
8⅝"	O.D.	.352 wall	1080 feet
9⅝"	O.D.	.395 wall	800 feet
14"	O.D.	.250 wall	400 feet
16"	O.D.	.250 wall	1600 feet
24"	O.D.	.281 wall	4500 feet
24"	O.D.	.406 wall	1500 feet
26"	O.D.	.281 wall	2400 feet
28"	O.D.	.281 wall	1500 feet
30"	O.D.	.500 wall	3000 feet

All 40 foot lengths
Small size pipe and tubing also available
Attractively Priced
for Immediate Shipment

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-964)
Kansas City 18, Kansas
ATwater 9305

EQUIPMENT FOR SALE

FOR SALE: 10,000'—4½" drill pipe, with tool joints cut off, located at Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

FOR SALE: Used 22-W and 24-L Bucyrus-Erie Spudder. Write or call Beacon Supply Company, Box 606, Farmington, New Mexico. Used 36-L Bucyrus-Erie Spudder, Beacon Supply Company, Box 398, Pampa, Texas.

FOR SALE: Failing Model 1500 drilling equipment. Have available for sale several drills exceptionally complete and in excellent condition. Particularly suitable for water well or deep core work. This equipment relatively new and now operating. Substantial savings possible. Box G-738, The Oil and Gas Journal, Tulsa, Oklahoma.

1,000 HP. NORDBERG DIESEL, Type TA-174, four cylinder, air injection, built in 1940, like new, pumps, coolers, tanks, compressor, all controls, centrifuges, etc., and 700 kw. Crocker Wheeler generator, 250 volt, 2800 amps. Cost new $185,000. Our price complete, $18,000. Kindly write for data and photo. Wabash Power Equipment Company, 31 E. Congress Street, DElaware 7-9262, Chicago, Illinois.

USED EXCELLENT CONDITION IN OPERATION

One Each (4¾" to 1") (8⅝" to 2⅜") (13⅜" to 4½") LANDIS Leadscrew Receding Head Pipe Threading and Cutting Machine Motor Driven.

OILFIELD SALVAGE CO., INC.
Phone CHarter 6914
P. O. Box 2589 Houston

ENGINES FOR SALE

1—Type X G.M.A. Bessemer Twin
1—Type X G.M.B. Bessemer Twin
1—Type 80 Cooper Twin
20—Compressor Cylinders, various sizes and pressures. Will sell any of the above as is or completely repaired.

W. S. SMITH
205 Thompson Bldg., Tulsa, Oklahoma
Phone 2-5473

A SURE SOURCE OF SUPPLY AT ALL MARKET LEVELS FOR CASING, TUBING AND LINE PIPE. INQUIRIES SOLICITED.

EQUIPMENT FOR SALE

FAILING model heavy duty 1500 drill and water truck. Write to Box 819, Longmont, Colorado, for details.

FOR SALE: At Bartlesville, one used Mayhew 1000 rig, purchased new in 1947 and mounted on 1½ ton 1947 V-8 Ford Coleman truck, engine #799-T 1547975, 3 speed auxiliary transmission ahead of rotary table, 3 speed Mayhew power take off, 4 wheel Coleman conversion drive, 8:25 x 20 10-ply tires all around, drill is chain pull down mechanical type, equipped with square Mayhew kelly, 4½" x 6" Gardner-Denver mud pump, 120' 2⅜" drill pipe with tool joints. Montana and Louisiana 1953 tags on unit. One spare tire. $6500.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

SHALLOW ROTARY ideal for 800' production drilling, complete with Wheatley 6x6, sand reel, 900' 2⅜ drill pipe, collar, core barrel, water tank, dog house and all necessary tools. Now in operation. Contact: Doug Evans, Dewey, Oklahoma, Route 1, Phone 799.

FRANKS Double Drum Spudder mounted on 8-ton International converted from gasoline to diesel. Good rubber. Capable of drilling or tailing-in to 4000'. Now carrying 3500' good ¾" wire. Mounted measuring line and meter. 53' 10 to 8 telescope pole. Ready to drive away. Call or write R. L. Orr, 930 West First St., El Dorado, Kansas. Phone 1444, if no answer 591 Caney, Kansas.

Bargain Sale

Complete Ajax Engines

5—Ajax 10½" x 13", Type CMBG, Horizontal Single Cylinder, Two-Cycle Gas Engines, complete with all standard equipment, including horizontal shifting mechanism, less sheave and foundation bolts.

$2,000 each—f.o.b. Tulsa, Oklahoma

Bethlehem Supply Company

Box 2171 Tulsa, Oklahoma
Phone 5-9261—Ext. 343

PIPE-LINE EQUIPMENT

We own and are dismantling all the pumping stations on the original Humbolt to Chicago pipe line. We offer for sale at bargain prices diesel engines, pumps, steam engines and steam pumps, A. C. and D. C. motors, generators, and controls of all sizes. A large quantity of 6"—8"—10" and 12" valves and many other items too numerous to mention. Write or wire us stating type of equipment in which you are interested, and descriptive list will be mailed promptly. Address

SUMMER & CO.
3937 Main Street, Kansas City, Missouri
Phone Jefferson 6400

EQUIPMENT FOR SALE

FOR SALE, near Maud, Okla.: One used erected 5,000 bbl. BS&B open top, flat seam bolted tank, used for fresh water. Price $1250.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: One Long Horn Trencher with 12" cutting buckets in excellent condition. Available for immediate delivery. Contact Modern Welding Company, P. O. Box 5008, Tulsa 16, Oklahoma, or Morder Welding Company, P. O. Box 528, Owensboro, Kentucky.

FOR SALE: At our East Chicago refinery one used 300 hp. Type T2RA Moore steam turbine, 2250 RPM, SMT 150#, exhaust 15#, Serial #3991. Price $1000.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE

SUPERIOR HEAVY DUTY DIESEL

510 hp at 360 r.p.m.—5 cylinder—14½x1 type ZDSB — non-reversing — vertical 4 cycle—cold starting—mechanical injection. Engine is totally enclosed. Complete with a 48" 7 groove V-belt sheave and new spare parts. For heavy duty pumping, dredge service, power generation textile and saw mills, mining, etc. EXCELLENT CONDITION, IMMEDIATE DELIVERY.

G. M. 3-71 DIESEL GEN. SET

30 kw. 2 cylinder 4½x5 diesel—radiator cooled—electric starting. Delco 3-60-440 generator — with switchgear. Skid mounted. Portable.

30 KW SHEPPARD DIESEL SETS

30 kw. Sheppard—115 volts DC—radiator cooled. Built 1950. Excellent condition self-mounted radiator and fuel tank. 16 units available.

60 KW CUMMINS DIESEL GEN. SET

120-240 volts D.C.—3 wire. Engine: 6 cyl. model H—heat exchanger cooled.

60 KW G.M. 6-71 DIESEL GEN. SET

Engine: G.M. 6-71 4½x5—6 cyl.—heat exchanger cooled. Generator: Star Electric —1.0 volts D.C.—500 amps.

75 KW WAUKESHA DIESEL GEN. SET

Totally enclosed. Engine: Waukesha diesel 6¼x6½—160 H.P. @ 1200 R.P.M. Generator: G. E. 75 kw. 230 volts D.C.—231 amps.—full load 300 volts.

100 KW G. M. 3-268A A.C. DIESEL GENERATOR SETS

440 volts—3 phase—60 cycle 20 kw. D.C. generator on same shaft—5 kw. exciter —120 volts D.C.—electric starting.

300 KW G. M. D.C. DIESEL SET

ENGINE: G.M. 8-268A—6½x7—1200 r.p.m. —air starting. GENERATOR: 300 kw. G.E.—120-240 volts D.C.—3 wire—totally enclosed—Marine type BB—with switchgear.

STEAM TURBO GENERATOR SETS

300 kw—120-240 volts D.C.—1200 r.p.m. —1250 amps.—turbine W.P., 225 lbs. to 440 lbs.

ENGINES SUITABLE FOR CONVERSION TO NATURAL GAS

(5) New STERLING marine gasoline engines, 900 H.P. @ 2100 RPM; 1200 H.P. @ 2800 RPM. 6⅜x6½—electric starting.

(9) HALL-SCOTT DEFENDER gasoline engines. V-type 12 cyl.—600 H.P. @ 2100 RPM—5¾x7—electric starting.

WINCHES SUITABLE FOR DRILLING RIGS

Hunt Tool Co.—double drum double gypsy. 50 H.P. 230 volt D.C. motor and hand brake. Complete with controls. Condition equal to new. 20 units available.

LARGE DRILLING RIG MOTORS

(4) 1375 H.P. @ 1300 RPM—415 volts D.C. Can be used as 700 RPM 230 volt D.C. motors @ 600 RPM. G. E.—Ex. Cond.

MARINE SURFACE CONDENSERS

1050 sq. ft.—3000 sq. ft.

THE BOSTON METALS CO.

313 E. BALTIMORE ST.
BALTIMORE 2, MARYLAND
CURTIS 7-5050

EQUIPMENT FOR SALE

MODEL H Fort Worth Spudder. Most of tools from 10" to 6". Eastern Kansas Gas Co., Iola, Kansas. Telephone 81.

REDA PUMP complete w/#4—20 Motor, 45½ H.P., 650 Volt, 41.6 Amps. #90—Pump Housing, #5595—Switchboard w/recording Ammeter 3400'—#4 Cable 125 Amp. Auto Transformer Accessories. Engine 225 H.P. Climax Type R-225 on Skid. Alternator G. E. 125—KVA., 100 KW., 440 V. A. C. w/Transformer, Flexible coupling and skid base. House—10' x 18' wood frame, w/G.I. Roof and Siding on Skid. Engine—165 Hp. Climax R-61 on Skid. Herndon Drilling Co., 421 Mayo Bldg., Tulsa, Phone 4-9700.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

11,000' 2" EUE 8rd. A1 Used Tubing. 8000' 4½" Electrically tested Drill Pipe. 3000' 3½" Drill Pipe. Used tubular goods available at all times. Phone 477, Giffin & Thompson Supply, Hoisington, Kansas.

FOR SALE: 24 W Bucyrus Drilling Machine, 1945 Model, V Belt drive, semi mounted on 750 duels, leaf springs with vacuum brakes, $5200.00. With following available Tools, 1950—2 ton Cabover Chev. truck, 1100' of ¾ drill line & ⅜ sand line, water tank, chain tongs, & numerous hand tools, 200 amp welding machine built into rig, complete $9000. A. & B. Drilling Co., Scobey, Montana.

FAILING MODEL 1500—on contract with major client in Montana. Write for details to Box G-703, The Oil and Gas Journal, Tulsa, Oklahoma.

SULLIVAN 200—Mounted on New Tandem International, complete with all tools. For price and inventory contact—Fleming, 2216 Greenway Blvd., Wichita, Kansas. Phone 5-7717.

FOR SALE: FOUR Cardwell K-Model Pulling Units complete and in good operating condition; also ONE Cardwell Mobilhoist with spudding attachment, double-pole mast, drill and sand lines, with tools. All equipped with Waukesha Engines. JAMES OIL WELL SERVICE, Hobbs, N. M. Dial 3-2331. P. O. Box 2196.

FOR SALE: Two skid mounted 315 air compressors—One gasoline driven Ingersoll-Rand; other diesel driven Schramm. Priced to move. Walters Drilling Co., 4114 McMillan, Dallas 6, Texas.

EQUIPMENT WANTED

INTERESTED in buying good used flat belts. Also parts for Superior and Black Bear Engines, new or used. Texas Consolidated Oils, Box 656, Cement, Oklahoma. Tele. 2521.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy contact Pressey & Son, Pueblo, Colorado.

HELP WANTED

EQUIPMENT WANTED

WE PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

INTERESTED in any amount 2⅞ double pin Hydril pipe. Must be in good condition. Box G-724, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

New 8 RD THD Casing Collars

500 8⅝" OD
500 9⅝" OD
500 10¾" OD

Will pay cash or trade other size collars, casing or line pipe. Must have at once. Phone, wire or write:

A. J. STRUBEL
4946 Murdoch, St. Louis, Missouri
Day—Laclede 2088
Nite—Sweetbriar 8152

HELP WANTED

GEOLOGIST WANTED: Fast growing Mid-Western independent (operating nation-wide) needs petroleum geologist. Prefer recent graduate with some major company experience. Must be interested in new scientific survey methods and willing to study and promote program based on latest methods. Must be capable of organizing and directing geological department when required. Excellent ground-floor opportunity for right man. State age, education, experience, salary expected, and other details first letter. Replies strictly confidential. Box G-736, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co. Box 2603, Tulsa, Okla. $5.00 cash.

EXPERIENCED refinery superintendent for Midwest independent refinery. Chemical engineering desirable. Initial letter application should set out past experience in detail, education and salary requirements. Replies strictly confidential. Box G-743, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED SEISMOLOGISTS. Party Chiefs, Seismic Computers, and Observers by major oil company. Seismologists will be permanently located in Mid-Continent Area. Applicants should have geological and/or geophysical background or at least five years' practical experience. Give full details of education and experience in letter. Reply to Box G-760, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

GRADUATE Chemists and Chemical Engineers with or without experience for positions in Research and Development department, located in Tulsa. State qualifications and salary expected. Write Personnel Department, P.O. Box 381, Tulsa 2, Oklahoma.

GRADUATE MECHANICAL ENGINEER

under 40 with at least 5 years experience in oil production to head sales promotion and advertising department of oil field equipment manufacturer.

Write
Box G-754,
THE OIL AND GAS JOURNAL
Tulsa, Okla.

HELP WANTED

SEISMIC SUPERVISOR required by expanding and aggressive seismic contracting company. Should have ability to supervise any domestic area and have good professional contacts. Minimum requirements; college degree in geophysics or related fields and eight years' seismic experience. Good future. Tulsa location. Box G-705, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL Engineer — familiar with the design and manufacture of oil field equipment—experienced in machine shop and foundry operations. Administrative and sales ability helpful. Graduate preferred. Give full details of past experience, references, and salary expected. Replies held confidential. Write Box G-746, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTH AMERICA. These jobs are with one of the better oil companies. Our fee paid. Mechanical Engineer — graduate, no experience required. Petroleum Engineer—graduate, no experience required. Chemical Engineer—graduate, no experience required. Mud Technician—two or more years' experience, single. Accountant—college graduate, Accounting major, single. All information confidential and should be mailed to CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 3-5168.

SALES ENGINEER: To represent well known valve manufacturing company. Must be college graduate, married, age 28 to 35. Willing to headquarter in Pittsburgh, Pennsylvania, and free to travel eastern states calling upon refineries, petrochemical plants, oil and gas producing companies and utilities companies who produce and distribute natural gas. Job is salaried with automobile and reasonable expenses allowed. Prefer someone with knowledge of valve applications and above type plants. All replies confidential. Furnish small photograph with application. Box G-741, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED FOR EMPLOYMENT: Petroleum Engineer or Geologist with two or three years' experience in Louisina Gulf Coast. Duties will entail preparation and maintenance of detailed structure and isopach maps of south Louisina fields and evaluations necessary in field studies. Work located in New Orleans with reliable and financially strong concern. Reply giving age, experience in detail and salary desired. Inquiries will be kept strictly confidential. Our employes know of this ad. Box G-713, The Oil and Gas Journal, Tulsa, Oklahoma.

REPRESENTATIVES now contacting operators of combustion engines, and supply stores. Products famous. Williston and others still open. Commission. Box G-761, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

DRILLING ENGINEER

SOUTH AMERICA

Major oil company affiliated with Standard Oil Company (New Jersey) has an attractive staff position available for qualified engineer.

Must have engineering degree and several years' responsible drilling engineering experience. Duties will include mud control, penetration tests, cost estimates, drilling equipment studies, etc.

Write giving age, marital status, education and detailed experience resume.

Box 308-N

Radio City Station

New York 19, N. Y.

SITUATIONS WANTED

DRILLING Contractor Contact Man: Extensive experience in drilling completion. Canada, Rocky Mountain, and Gulf Coast. Box G-740, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

GEOPHYSICIST desires job as supervisor or better. May consider starting crew for or with interested parties. Box G-763, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SECRETARY, Bookkeeper, detail clerk, experienced in land, production and drilling. Oklahoma City area only. Box G-764, The Oil and Gas Journal, Tulsa, Oklahoma.

MAJOR company drilling superintendent experienced in drilling, completion and production of oil and gas wells in the Mid-Continent area seeks operating position with progressive organization which can more fully utilize latent abilities. Engineering background, 36, married. Box G-732, The Oil and Gas Journal, Tulsa, Oklahoma.

MECH. ENGINEER: 12 years' refinery experience, 4 years in eng. design; 8 years in plant operation & maint. 37 years old, married. Desire responsible position with Engineering Co., Southwest preferred location. Box G-733, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE MANAGEMENT — Exploration Programs (geological, land, drilling), engineering graduate, age fifty, wide experience, recently Kansas. Will consider retainer and participation, or straight salary. Box G-744, The Oil and Gas Journal, Tulsa, Oklahoma.

AREA SALES MANAGER. Drilling and completion equipment. Ten years' actual field experience. Box G-739, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION Permanent Independents and Reliable Investment Groups: PRACTICAL OIL GEOLOGIST locating in Denver about Nov. 1. Age 30. 5½ years with major company in Texas, La., New Mexico, and Western Colorado. Native of Oklahoma. Personal and business contacts throughout the Rockies, Mid-Continent and Texas. Bachelors and Masters degrees. Experienced at field development; conceiving, supervising and executing local and regional structural and stratigraphic studies; and training geologic personnel. Expert sample man and well sitter. References. Desire full or part time consulting position which includes opportunity to participate. Write Box 95, Denver, Colorado.

EXPERIENCED GEOLOGIST: Eight years' experience in North Texas, West Texas and Mid-Continent Areas. Fully qualified to conduct a successful exploration and development program for small company or independent. Was formerly district geologist for major oil company. Box G-752, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND—LEASE—TITLEMAN—Licensed attorney well experienced in field and office with major company in Mid-Continent areas desires change to expanding independent production company. Location optional. Box G-750, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN—Title, Rental, Division Order and Utilization experience—6½ years with major oil company. Desires change to expanding independent. Now in Gulf Coast Area. Can relocate and travel. BS degree. Age 29. Box G-737, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

ROYALTIES

DEALERS, INVESTORS—Proven acreage or wildcat. Pipeline Royalty paying good interest. $100 acre up. References. E. M. Adams, Marshall, Texas.

QUICK Cash for your producing royalties, over-riding royalties, and production. Robert Kinkaid, Post Office Box 26, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

ELECTRICAL CONTRACTORS

Office Phone 5-5315	Res. Phone 7-4950

W. L. RATCLIFF COMPANY

ELECTRICAL CONTRACTORS

Industrial—Commercial—Distribution

W. L. Ratcliff	506 Caddo St.
P. O. Box 373	Shreveport, La.

LEASE AND DRILLING BLOCKS

DRILLING DEALS—80 and 100 acre leases in Montgomery County, Kansas. Write W. J. Forsyth, 117 So. Penn., Independence, Kansas.

DRILLING DEAL: Pawnee County, Oklahoma; 240 acres; 3 sands; between production; demand reliable operator, quick action; 2800 feet. Phone 1258, Seminole, Oklahoma.

FOR SALE: Oil and Gas Leases: 200 acres in 3N-3E, Garvin County, Oklahoma, at $10.00; 400 acres in 3N-4E, Pontotoc County, Oklahoma, at $5.00; 8,000 acres in 2N-20E, DeBaca County, New Mexico at $1.50; 1,800 acres in Sherman County, Kansas. Box G-748, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Settled oil production, approx. 1,500 bbl. per day, with proven acreage to drill. Give complete details in first letter. Be sure you can deliver. Stauffer, 108½ E. Grand River, Howell, Michigan.

300 ACRES—Six wells, 1,200 ft., new locations, more acreage available. Indiana-Ohio line. Price, 55 Virginia Ave., Indianapolis.

$60,000 will buy large judgment 33,000 acres Missouri. May have oil. Box G-762, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

WESTERN KENTUCKY, LOGAN COUNTY

Over 3,000 acres on structure. Will deal all or part. Dry hole money available. One light producer in Devonian T. D. 1404 ft. Another well drilling. Drilling deals arranged. Bank references.

Box G-765

The Oil and Gas Journal

Tulsa, Oklahoma

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo

PRODUCTION FOR SALE

PRODUCTION FOR SALE: 100-bbl. per day Pa. Grade. Settled production. West Virginia. M. Eddie Hersuson, Spencer, West Virginia. Phone 275.

FOR SALE MAPS

DRY HOLE MAP OF OREGON, 42" x 72". DRY HOLE MAP OF WASHINGTON, 42" x 84". Price, $10.00 per map. Northwest Scouting Service, Public Service Building, Portland, Oregon.

AERIAL PHOTOGRAPHY

Government AERIAL Photography
and CONTROLLED MOSAICS for exploration Phone ADams
operational plans, right-of-way, bounderies 4-8060
Our integrated service of personal search, reporting, prepaid orders, and delivery follow up usually saves you a month's delay and difficult correspondence with numerous gov't agencies on procurement of inexpensive stereo prints, controlled mosaics, etc. Often locates hard-to-find coverage. U. S. air coverage divided among various agencies each operating separately. Fees quoted on an assignment based on work necessary. Original gov't. prepayment receipts furnished; prints shipped you direct. If ready made **Controlled Mosaics** not available for an area, can quote on CONTROLLED MOSAICS especially made from gov't photography by experts in photogrammetry. Services for ready-made foreign air photography also made. WRITE DEPT. 1612. WASHINGTON COMMERCIAL CO., 1200 Fifteenth St. N. W., Washington 5, D. C.

MAILING LISTS

MAILING LISTS of the oil industry. Our 30th year. Send for catalogue. Oil Industry Mailing List Co., 405 Tuloma Bldg., Tulsa, Okla.

FOR SALE—PUBLICATIONS

OIL AND GAS LAW—TEXAS

A compilation of eight lectures on Texas Oil & Gas Law by outstanding attorneys, landmen and brokers to professional oil men in the Permian Basin.

PRACTICAL—USEFUL—CONCISE

Basic information on ownership of lands, leasing, sale of minerals and royalty, written in layman's language.

Includes OIL & GAS LEASES AND ESTATES, EXECUTION OF LEASES AND ASSIGNMENTS, TITLE EXAMINATION, THE LANDMAN'S FUNCTION and other titles.

BOOK FORM $5.00. Send check to
W. C. MONTGOMERY
Dept. "A," P.O. Box 2503, Midland, Tex.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

EQUIPMENT MEN

Mechanical Design Names Klein Chief Engineer

G. F. KLEIN

George F. Klein, Jr., has been named chief engineer for Mechanical Design, Inc., affiliate of Refinery Engineering Co., according to announcement by Herbert E. Dyer, vice president and general manager.

Klein was formerly affiliated with Spencer Chemical Co., Pittsburg, Kans., where he served as chief engineer. Experience with Hercules Powder Co., Allied Chemical & Dye Corp., and Procter & Gamble Manufacturing Co. preceded his service with Spencer Chemical.

Frank Kreider Heads Darling Valve Sales

Darling Valve & Manufacturing Co., Williamsport, Pa., has selected Frank B. Kreider as general sales manager, according to an announcement by Marshall L. Hough, president.

Kreider is a graduate of Carnegie Institute of Technology in management engineering, and a registered professional engineer. For the past 4½ years he has been eastern regional manager, insulation division, for Pabco Products, Inc.

Oil Well Names Minnerly To Denver Sales Office

The appointment of W. O. Minnerly as city representative at Denver for U. S. Steel's Oil Well Supply Division was announced recently by R. L. Armstrong, the division's Rocky Mountain area manager.

Minnerly entered the employ of Oil Well in 1947 as city representative at Dallas. In 1952 he transferred to Midland, Tex., where he remained until his latest appointment.

Thompson Tool Appoints Moore Specialty Co.

Thompson Tool Co., of Iowa Park, Tex., manufacturers of Thompson rotating shale separators and Thompson vibrating shale shakers, has announced the appointment of Moore Specialty Co., Casper, Wyo., as its sales agents for the states of Colorado, Wyoming, Montana, North Dakota, South Dakota, Nebraska, Utah, and Idaho.

Alten Foundry Announces Engineering Promotions

Warren M. Benson, vice president, Alten Foundry & Machine Works, Inc., Lancaster, Ohio, has announced the promotion of Fred R. Bayne to the position of chief engineer, and William A. Morris, Jr., as product development engineer.

Bayne, a graduate of Virginia Polytechnic Institute, came to Alten as assistant chief engineer from Cincinnati Milling Machine Co. in 1951. Morris served as consultant engineer at Parkersburg Rig & Reel prior to his new appointment.

Viator Is Named Sales Representative for WECO

JOE VIATOR

Joe Viator has been appointed sales representative in southern Arkansas, East Texas, and southern Louisiana, according to an announcement by John W. Gates, sales manager, Well Equipment Manufacturing Corp. Viator will make his headquarters in Shreveport.

Before assuming his new position with WECO, Viator was sales representative for Bethlehem Supply Co. in South Louisiana. He has completed an extensive program in the WECO plant at Houston, becoming familiar with the complete line of WECO unions, blocks, compounds, Chiksan swivel joints, steel rotary hose, and other products.

Hydril Promotes Odum to District Sales Manager

Announcement is made by Hydril Co. of the appointment of Marvin E. Odum as district sales manager with headquarters at the company's Houston office.

Odum has been associated with Hydril since 1938, and had a wide experience in the manufacturing and field departments in California and Texas before he entered the sales department in 1945.

G.S.I. Promotes Ellsworth To Sales Post at Dallas

Geophysical Service, Inc., has announced appointment of T. P. Ellsworth, formerly division manager of its West Coast division, as sales manager in the G.S.I. marketing department.

Ellsworth has moved from Bakersfield, Calif., to Dallas, where he will

work from the general headquarters of G.S.I.

Ellsworth formerly served as a party chief with Western Geophysical Co. from 1936 to 1943. He was chief geophysicist with Richfield Oil Corp. from 1943 to 1951. In 1951 he joined the staff of Geophysical Service as division manager, West Coast division.

Pipe Linings, Inc., Buys Bechtel Somastic Division

The Bechtel Corp., San Francisco, and Pipe Linings, Inc., Los Angeles, have announced the sale of the Somastic Division of Bechtel Corp. to Pipe Linings, Inc., which company is a wholly owned subsidiary of American Pipe & Construction Co.

All operations conducted in 11 western states and all foreign countries will now be handled by Pipe Linings. The transfer includes all patent rights and licenses to the Somastic Pipe Coatings process for the exterior treatment of steel pipe as protection against corrosion, material-manufacturing and application plants currently in operation on the West Coast, and all personnel of the Somastic Division.

J. S. Connell, general manager of the Somastic Division, Bechtel, will remain in an advisory capacity. Austin S. Joy, general sales manager, will move over to Pipe Linings, Inc., as sales manager of that organization.

WILDCAT COMPLETIONS

(Continued from page 193)

Socony-Sohio 1 Lisieux, LSD 4, 12-4-30w2. Dry. TD 6,714 ft.

North Pacific-North Canada 1 Battleford, LSD 3, 2-46-16w3. Dry. TD 2,073 ft.

Plymouth-Sun 1 Talmage, LSD 9, 22-9-13w2. Dry. TD 4,861 ft.

Shell 10A Wood Mountain, LSD 2, 24-1-6w3. Dry. TD 4,833 ft.

BRITISH COLUMBIA

J. B. White-Nominee-Sun 4 Blueberry, unsurveyed territory. Dry. TD 4,672 ft.

Gulf States-Fargo 1 Sunset, NE¼ 76-18w6. Dry. TD 5,325 ft.

ALBERTA

Husky-Greta-Canadian Superior 1 North Duhamel, LSD 9, 22-46-21w4. Dry. TD 5,551 ft.

Calalta-Phillips-Shell 1 Foremost, LSD 6, 33-7-10w4. Dry. TD 4,235 ft.

Long Island-Poplar 6-21 Ranchmen's, LSD 6, 21-35-9w4. Viking sand oil well. TD 3,006 ft.

Bankers 1 Griffen, LSD 9, 9-58-6w4. Dry. TD 2,080 ft.

Canadian Montana Gas Co. 16-21, LSD 16, 21-5-13w4. Dry. TD 3,160 ft.

Long Island-Imperial 6 Manawan Lake, LSD 7, 29-57-25w4. Dry. TD 3,883 ft.

Hudson's Bay-Ohio 8 Sparky, LSD 13, 6-28-4w4. Dry. TD 3,324 ft.

Texaco A-1 Vauxhall, LSD 4, 29-12-16w4. Dry. TD 3,334 ft.

Northern Development-Union 13-11 Crown, LSD 13, 11-12-14w4. Suspended. TD 3,134 ft.

ADVERTISERS IN THIS ISSUE

Aerofin Corporation 26
Alloy Steel Products Co., Inc. 107
American Cyanamid Company 97
American Locomotive Company 24, 25
American Manufacturing Co. of Texas 4
Ampco Metal, Inc. 185
Anderson Brothers 152
Armco Drainage & Metal Products, Inc. 73
Autocar Company, The 29
AVCO Manufacturing Corporation, Lycoming-Spencer Division 8
Baker Oil Tools, Inc. 143
Beryllium Corporation, The 49
Black, Sivalls & Bryson, Inc. 15
Bowen Co., S. R. 191
Braden Winch Company 146
Broderick & Bascom Rope Co. Back Cover
Brown & Root, Inc. 89
Butler Manufacturing Co. 80
Byron Jackson Co. 27
Cable Engineering 182
Carlon Products Corporation 28
Cast Iron Pipe Research Association 181
Chapman Valve Mfg. Co., The 34
Charles Machine Works, The 168
Chicago Bridge & Iron Company Inside Back Cover
Chicago-Wilcox Mfg. Co. 165
Chrysler Corporation, Industrial Engine Division 37
Cities Service Oil Co. 32, 33
Classified Advertising 193, 200, 201, 202
Cleaner Pipelines Co. 161
Cleveland Worm & Gear Co., The 12
Crose Manufacturing Co., Inc., M. J. 161
Darling Valve and Mfg. Co. 48
Davey, Paxman & Co. Ltd. 159
Dean Brothers Pumps, Inc. 149
De Laval Steam Turbine Co. 16
Delta Engineering Sales Co. 165
Deublin Company 194
Diamond Chain Company, Inc. 170
Dowell Incorporated 56
Dresser Manufacturing Division 51
Drilling & Service, Inc. 193
Drilling Equipment Mfg. Co. 181
du Pont 3, 35
Electrofilm, Inc. 185
Elliott Company 42, 43
Emsco Manufacturing Company 139
Fairbanks, Morse & Co. 2
Filtrol Corporation 128
Flexrock Company 115
Fluid Packed Pump Company 103, 104
Fort Worth National Bank, The 173
Foster Engineering Company 147
Four Wheel Drive Auto Co., The 174, 175
Foxboro Company, The 30
France Packing Company 164
General American Transportation Corporation 93
General Electric Co., Electronic Dept. 45
Geolograph Company, Inc., The 181
Glitsch & Sons, Inc., Fritz W. 109
Grancell, I. H. 167
Graver Tank & Mfg. Co., Inc. 112, 113
Grinnell Company, Inc. 7
Guiberson Corporation 166
Halliburton Oil Well Cementing Co. 9, 90
Harnischfeger Corp. 100, 101
Helicoid Gage Division, American Chain & Cable Co. 102
Hewitt Rubber Division, Hewitt-Robins, Incorporated 190
Houston Contracting Company 162
Huey & Co., S. E. 162
Hughes Tool Co. Front Cover
Hunter Engineering Co., W. H. 191
Inferno Co., The 167, 182
Insley Manufacturing Corporation 194
International Business Machines Corporation 183
International Harvester Co. 95
International Nickel Company, Inc., The 134
Jet-Lube Inc. 168
Johns-Manville Corporation 143
Johnston Testers, Inc. 46
Kemp Mfg. Co., C. M. 18
Koppers Company, Inc. 131
Lane-Wells Company 54
Linde Air Products Company, A Division of Union Carbide and Carbon Corp. 6
Lonergan Co., J. E. 152
Manhattan Rubber Division, Raybestos-Manhattan, Inc. 99
Manning, Maxwell & Moore, Inc. 132
Marlow Pumps 177
Martin-Decker Corp. 36
McCord Corporation 168
McCullough Tool Company 157
McIntosh-Barton & Co. 124
Metal Goods Corporation 40
Minneapolis-Honeywell Regulator Co., Industrial Division 10, 11
Mission Mfg. Company 187
Monsanto Chemical Company 163
Morgan, Stanley & Co. 185
Murphy, Frank W. 149
Murphy Diesel Company 136
National Airoil Burner Co., The 164
National Supply Co., The 19, 20, 21, 22
Nicolet Industries, Inc. 149
Nordstrom Valve Division, Rockwell Manufacturing Company 38, 39
Oil Metering and Processing Equipment Corporation 123
Onan & Sons, Inc., D. W. 184
Pacific Car and Foundry Company 140
Pacific Gear & Tool Works 147
Pacific Pumps Inc. 183
Paris Distributor, Inc., Henry H. 122
Parkersburg Rig & Reel Co. 52
Peerless Supply Co. Inc. 162
Petroleum Electric Power Assn. 17
Petroleum Equipment Suppliers Assn. 144, 145
Pipeline Anode Corp. 162
Pure Oil Company, The 47
Quaker Oats Company, The 44
Radio Corporation of America 41
Refinery Supply Co., The 124
Regan Forge & Engineering Co. 160
Reynolds Fasteners, Inc. 141, 142
Rockwell Manufacturing Company 153, 154
Ross-Martin Co. 168
Ryerson & Son, Inc., Joseph T. 176
St. Joseph Lead Company 126
Scott-Rice Company 165
Socony-Vacuum Oil Co., Inc. 23
Stearns-Roger Mfg. Co., The 204
Steel Forgings, Inc. 162
Thomas Flexible Coupling Co. 180
Union Carbide and Carbon Corporation, The Linde Air Products Company 6
Victor Products Corp. 165
Vogt Machine Co., Henry 14
Wagner Electric Corporation 13
Walker Co., W. L. 152
Wall Colmonoy Corporation 160
Walworth Co. 5
Well Equipment Mfg. Corp. 178
Western Gear Works 151
Western Inspection Co. 191
Wichtex Machinery Co. 179
W-K-M Company 31
Wyatt Metal & Boiler Works Inside Front Cover
York Co., Inc., Otto H. 138
Young Radiator Company 50

LEGAL

NOTICE OF SALE OF OIL, GAS AND SULPHUR LEASE

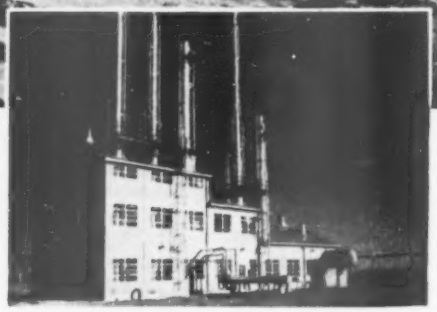
Pursuant to the provisions of Chapter 150 of the General and Special Laws of the State of Texas, passed by the 45th Legislature at its Regular Session, as amended by Senate Bill 248, passed by the 53rd Legislature at its Regular Session, the Board of Directors of the Agricultural and Mechanical College of Texas hereby offers for sale at public auction in the Office of the Comptroller, Room 201-D, System Administration Building, College Station, Texas, at 10:00 a.m. Monday, November 23, 1953, the oil, gas, and sulphur lease on approximately three hundred twenty (320) acres of land occupied by the Texas Forest Service, located near Rusk in Cherokee County, Texas, being the same land patented to T. M. Dement on December 11, 1857, said patent being recorded in Volume M, Page 473, Deed Records of Cherokee County, Texas. Only cash bids will be considered. The right is reserved to reject any and all bids. For lease forms and particulars, address Comptroller, Texas Agricultural and Mechanical College System, College Station, Texas.

WHERE BLIZZARDS RAGE

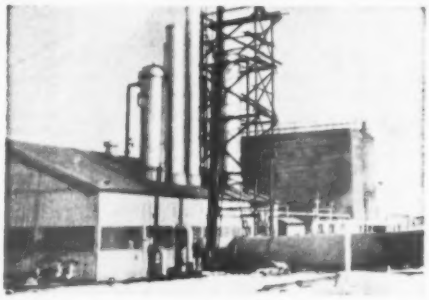
From Kansas north, winter conditions can slow the efficiency of gas processing plants "to a crawl"... unless the plants are designed and built to specifications which differ widely from those used far south of the blizzard belt.

We've built gas processing plants throughout the south and southwest, of course—lots of them. But for experience in design and construction of COLD COUNTRY PLANTS, Stearns-Roger stands in a unique position.

This experience began in the early '20s in Wyoming. Augmented for more than 30 years, it now represents a fund of "know-how" of potential value to every company with operations in areas where severe winters are a problem.



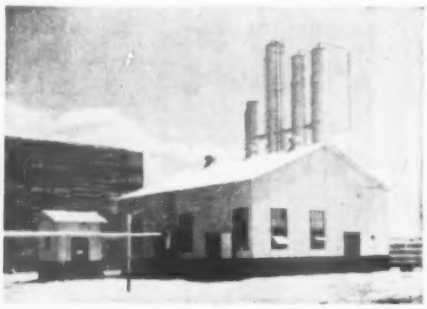
Natural Gasoline Plant for the Ohio Oil Company near Sidney, Nebraska. All-weather housing of instrumentation, pressure vessel bases, and other major equipment assures comfortable, safe, efficient operation uninterrupted by weather 365 days a year.



1934 addition to Absorption Plant at Cutbank, Montana, designed and built for Montana Power Co. in 1932. Plant contains several "firsts" and includes probably the industry's first pipeline dehydration plant. Note all-weather housing.

ENGINEERING
DESIGNING • MANUFACTURE
CONSTRUCTION

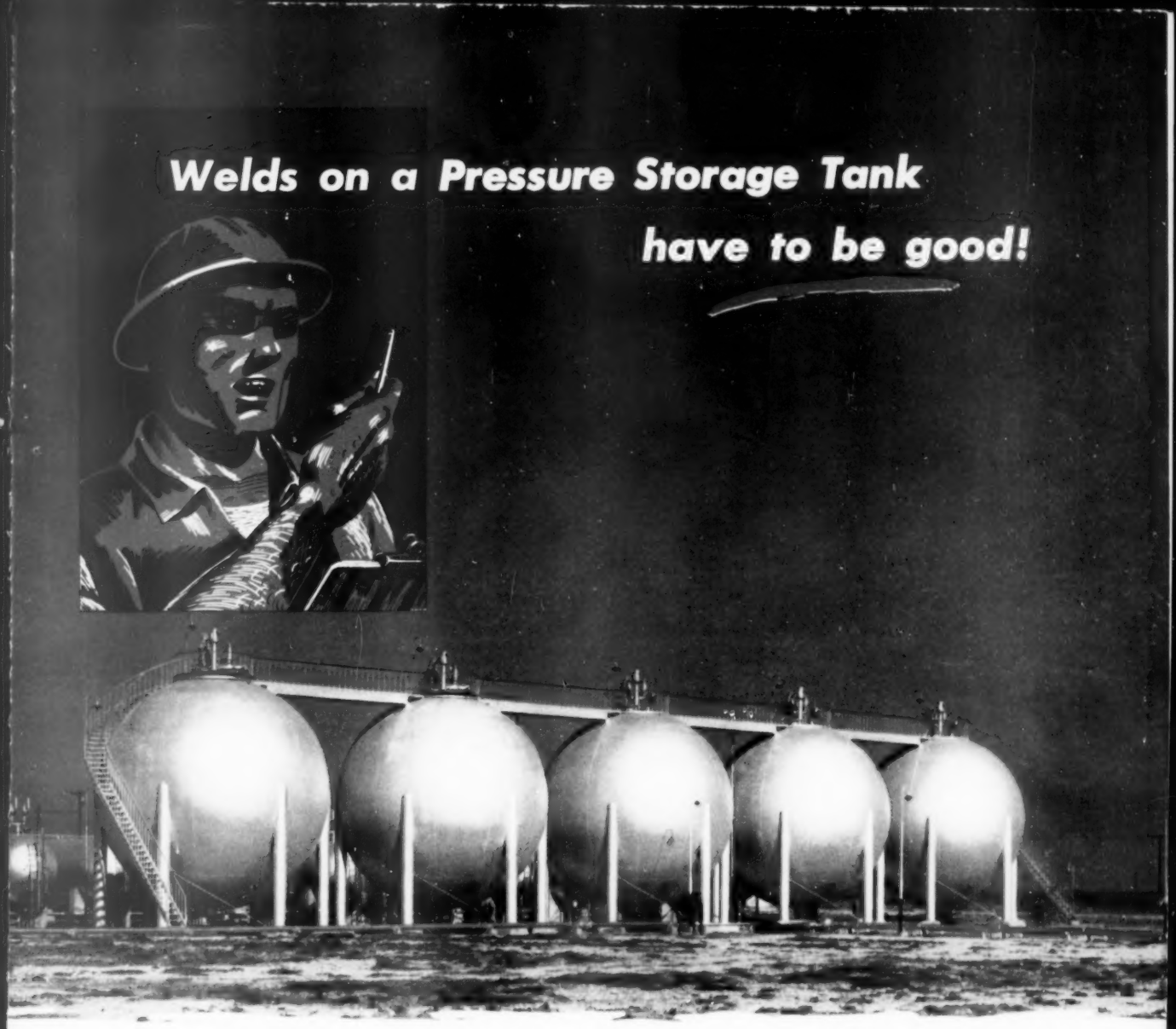
Continuous high efficiency was assured by all-weather design and construction of this plant for a major oil company at Lance Creek, Wyoming.



Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER, COLORADO

DENVER • HOUSTON • SALT LAKE CITY • EL PASO



Hortonspheres are designed especially for the storage of volatile hydrocarbons with a working principle based on the fact that no loss can take place unless vapor escapes. Every weld on a Hortonsphere *has to be good* . . . and the Chicago Bridge & Iron Company Field Welding Supervisor helps the Foreman make sure they are.

The Field Welding Supervisor assists in training and supervising welders and checks welding equipment and welding techniques on a job. He helps magnaflux, x-ray or stress-relieve welds when called for by specifications and supervises the cutting and grading of test plugs. This complete service is provided on every Horton welded tank built . . . at *no extra cost* to you!

Information, estimates or quotations on any Horton tank may be had by writing our nearest office. There is no obligation on your part.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3	2154 Healey Bldg.	Detroit, 26	1514 Lafayette Bldg.	Philadelphia, 3	1615–1760 Walnut Street Bldg.
Birmingham, 1	1536 North 50th St.	Havana	402 Abreu Bldg.	Pittsburgh, 19	3228 Alcoa Bldg.
Boston, 10	1025-201 Devonshire St.	Houston, 2	2119 C & I Bldg.	San Francisco, 4	1554–200 Bush St.
Chicago, 4	2128 McCormick Bldg.	Los Angeles, 17	1523 General Petroleum Bldg.	Seattle, 1	1325 Henry Bldg.
Cleveland, 15	2204 Midland Bldg.	New York, 6	3347–165 Broadway Bldg.	Tulsa, 3	1606 Hunt Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructiones Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprima, N.V., 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industria Petroli, Rome, Italy
Whessoe Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo, 275, Grupo 306, Rio de Janeiro, Brazil

BRODERICK & BASCOM

Yellow Strand®

PREFORMED WIRE ROPE

Does your *protection* extend to wire rope when schedules are tight?

Wire rope that combines strength, flexibility and ease of handling belongs in the category of safety equipment. These qualities are bred into Preformed Yellow Strand. But look to this long-lived rope, too, for help in warding off intangible hazards. When you are pressing to beat a deadline or protect a narrow margin, top-grade steel wires and skilled engineering will be working on your side: resisting premature replacement . . . keeping production high . . . holding job costs in line. Say the word and one of our wire-rope engineers will gladly check your installations.

Broderick & Bascom Rope Co.
St. Louis 15, Mo.

Houston Factory and Branch: 9350 Market Street Road
Odessa, Tex., Branch: 3601 West Second Street
Los Angeles Branch: 2441 Hunter Street
San Francisco Branch: 899 Bryant Street

THE CONTINENTAL SUPPLY CO.
Mid-Continent and Rocky Mountain Distributors—Stores in All Active Fields

McJUNKIN CORPORATION
Charleston, West Virginia, and Branches